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ABSTRACT

The emphasis of this symposium was to examine national and international ways to preserve, access, and digitize human heritage and culture. Many internationally recognized librarians shared their experiences and ideas on that topic. The 19 papers presented at the symposium dealt with issues such as: the impact of new technologies on information access and delivery; the impact of the electronic frontier on relationships between academic programs and research libraries; the economics of electronic or virtual libraries; electronic acquisitions policy; the challenges of preserving the information content while adapting to a new medium; document delivery in the 1990s; librarian education in the 21st century; fair use issues in electronic publishing; the possibility of a German national archive for electronic media; the effects of electronic publishing on library services; paradigm shifts in library automation caused by access to a global market; resources for an electronic library; national self-sufficiency in the electronic age; cooperative projects aiming for electronic libraries; and aesthetic issues in format conversion. The symposium agenda, a list of participants, and a list of participating vendors are provided. Many papers contain author abstracts and references. (BEW)

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Pat Botti

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Essen University Library

Electronic Documents and Information : From Preservation to Access

18th International Essen Symposium
23 October - 26 October 1995

Festschrift in honor of
Patricia Battin

Edited by
Ahmed H. Helal
Joachim W. Weiss

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18th International
Essen Symposium 1995

Essen University Library

Electronic Documents and Information : From Preservation to Access

23 October - 26 October 1995

Preface

The annual International Essen Symposium which was the 18th in its series was held, as traditionally, in Essen University Library during the period from 23rd to 26th October, 1995 with full registration of about 100 invited participants, 22 speakers, and 18 vendors. The international aspect of the Essen Symposium was reflected by the representatives of 15 countries who are experts in modern advancements in library developments and international activities.

The theme of the 18th International Essen Symposium was: "Electronic Documents and Information : From Preservation to Access". As in the previous Symposia internationally distinguished colleagues expressed their ideas and thoughts about possible national and international ways to preserve, access, digitize, etc. human heritage and culture.

The 18th International Essen Symposium was held in honor and devoted to an outstanding leader and worldwide known colleague - to Ms. Patricia Battin. She has a major influence and impact in the fields of library automation, library administration, electronic libraries, librarianship in the information age, and preservation and access. Her contributions on preservation as well as on cooperative preservation and access are nationally and internationally appreciated and highly recognized. Since the foundation of the Commission on Preservation and Access (CPA) in 1986, Ms. Battin was president of the CPA up to 1994. However, she is still very active in the field of preservation and her advise is welcomed and wanted.

Patricia Battin received her B.A. (High Honors) in English Literature from Swarthmore College (1951) and her M.S. in Library Science (1967) from Syracuse University. She is now the Director of Planning, Emory University Virtual Library Project.

During the previous 30 years she was:

1987-1994	President, Commission on Preservation and Access	
1978-1987	Vice President for Information Services/University Librarian, Columbia University	
1982	Interim President, Research Libraries Group	
1974-1978	Director, Library Services Group, Columbia University	
1964-1974	State University of New York at Binghamton	
	1970-1974	Assistant Director for Reader Services
	1969-1970	Assistant to the Director of Libraries
	1968-1969	Associate Librarian, Cataloging
	1967-1968	Assistant Librarian, Cataloging
	1964-1966	Library Intern

Patricia Battin has won several awards and honors:

- Phi Beta Kappa
- Beta Phi Mu
- Association of College and Research Libraries: Academic/Research Librarian of the Year, 1990
- Honorary Doctor of Humane Letters, Lehigh University, 1990
- Honorary Doctor of Humane Letters, Emory University, 1993

The professional activities of Ms. Battin range from:

International Activities

- Member, Third U.S.-U.S.S.R. Symposium on Information and Documentation in the Social Sciences and Humanities, 1983-1987

- Organizer, Working Meeting on Establishing Minimal Level Bibliographic Records for Preservation Microfilms, Zurich, May 1990
- Organizer, Conference on Preserving Our Intellectual Heritage, Bellagio, Italy, June 1992
- Presentations and participation in conferences and seminars in Japan, Australia, Germany, and England

Professional Activities

- CAUSE Board of Trustees, 1993-
- Getty Art History Information Program Advisory Committee, 1992-
- Harvard University Committee to Visit the Office for Information Technology, 1985-1991
- Lehigh University Board of Trustees, 1989-
- Lehigh University Trustees Executive Committee, 1994-
- Lehigh University Library Visiting Committee, 1983-1989
- Lehigh University Visiting Committee on Computing and Communications Services, Chairman, 1989-
- Council on Library Resources Board of Directors, 1984-1993
- Council on Library Resources Research Library Committee, 1987-1990
- Council on Library Resources Foundations Library Committee
- Stanford University Advisory Council on Libraries and Information Technologies, 1992-1995
- Stanford University Visiting Committee to the Libraries, 1987-1992
- Syracuse University Board of Visitors of the School of Information Studies, 1981-1990
- Yale University Council Committee on the Library, 1985-1990
- EDUCOM Board of Trustees, 1983-1989
- National Library of Medicine Strategic Planning Committee, 1985-1986
- National Advisory Committee to the Gannett Center, 1985-87
- Association of Research Libraries Board of Directors, 1982-1985

- Association of Research Libraries Office of Management
- Studies Advisory Committee, 1982-1983
- *Research Libraries Group, Inc.*
    - Board of Governors, 1974-1987
    - Executive Committee, 1974-1982, 1984-1987
    - Chairman, Board of Governors, 1985-1986
    - Chairman, Program and Operations Committee, 1979-1982
- Center for Research Libraries Program Committee, 1982-1985
- New York State Commissioner of Education's Committee on Library Development, 1980-1982
- American Council on Learned Societies Joint Advisory Committee on East Asian Libraries, 1978-1981.

The 18th International Essen Symposium focused on a major problem which is internationally recognized and has led to worldwide action:

"*Known and unknown library and archival treasures which constitute a unique memory for the world have been and continue to be lost through natural calamities, war devastations, and from the ravages of climate and weather. The magnitude of the problem of safeguarding this memory is such that it defeats the resources of any single country. An international program is urgently needed to develop a collective plan of action that would set up institutional mechanisms and determine priorities worldwide.*"

(Statement from UNESCO's *Memory of the World* Initiative, 1993)

Through the use of mass conservation techniques - deacidification of paper, microfilming and digitalization of records - we can save our cultures heritage in the spirit of worldwide cooperation insuring and making access possible among all countries and throughout all time. The human culture heritage should cover not only what we currently read in books but also what we access in digital form through computers.

The main issue is who will be responsible for preserving the cultural heritage to future generations. Shall the national libraries and other libraries receiving legal deposits have the sole responsibility. Or, do we need in addition to the printed version a digital copy?

"*The overcoming of national boundaries by electronic technology, to access the world literary heritage, calls into question the desirability or a necessity for comprehensive national collections.*" (Maurice B. Line)

National programs such as the "Commission on Preservation and Access" in the United States and the "EROMM" commissioned by the Commission of the European Union and the European Commission on Preservation and Access (ECPA) have two goals in their philosophy. One is to promote cooperation among countries and secondly in raising awareness and assistance for a problem which threatens the human intellectual heritage.

Technology developments have assisted the preservation of the British Library collection and, as never before, allowed the British Library to make it available, in electronic form, to scholars throughout the world. The DiSCovery project for example combines "*the latest technology and operational practices into a system that has the potential to revolutionize the way users access and receive material from the British Library ...*" (Frank B. Oliver)

The ambitious goal of Die Deutsche Bibliothek is to give access to the relevant bibliographic databases and later on of the original document via net possibilities. In addition, decision making bodies in Germany like the German Research Association are deeply concerned with the future of preservation and access to documents and the impact of electronic publishing of the services of scholarl y libraries.

Some university libraries like the University of Haifa Library and De Montfort University Libraries have been engaged in a program of electronic library projects in recent years. The aspects of the program in Haifa range from building up a networked digital library of Hebrew journals with scanned full images of articles with an index; in De Montfort it reaches from negotiations of licenses and rights from copyright owners to copy, store and disseminate materials in electronic form. However, the acquisition policy in the electronic environment is still an open issue.

In the first issue of "Advances in Preservation and Access" (1, 1992, pp. 41-48) Ms. Patricia Battin published a very interesting paper with the title "'*As Far Into the Future As Possible': Choice and Cooperation in the 1990s*". In this milestone paper Ms. Battin started her paper with, "*If the preservation challenge for the nineties could be characterized by one word, that word would be 'choice'. The most significant change brought about by* *technology, and the one that underlies the comprehensive preservation challenge for the nineties, is that we can now create, store, distribute, and use data in different formats and media... In this new world, the printed document will share its historic dominance with a multitude of other media for the recording of our intellectual and cultural creativity."*

"*Preservation, a serious cultural crisis, calls for unprecedented cooperative action set in a global context, to save the human record of our respective communities*", "*...only through creative, cooperative programs on an international scale can we afford the heavy cost of preserving our intellectual heritage while, at the same time, continuing to build our print collections and open new avenues to knowledge contained in electronic formats.*"

The message for the librarian in the digital world must mean that preservation means copying and deep knowledge of advanced technology is involved and necessary. This means that cooperation and coordination with specialized computing centers and their managers are necessary.

In another paper in "Library issues" (Vol. 13, (2), Nov. 1992) Ms. Battin underlined the following issues: "*Our nation's research collections are perhaps the most valuable assets, in both financial and intellectual terms, of our higher education establishment. Yet we have treated them... as operating budget items assumed to last indefinitely....*" "*We recognized that the preservation crisis could well serve as a laboratory for exploring issues that must be faced in reconceptualizing all library and archival services for the 21st century.*"

She concludes her paper with the following statement: "*From this strategic perspective, the Commission's preservation activities focus on both the past and the future to reconceptualize library and archival services for the next century.*"

In the last years, the Commission on Preservation and Access and the Research Libraries Group created the Task Force on Digital Archiving. The purpose of the Task Force is to investigate the means of ensuring "*... continued access indefinitely into the future of records stored in digital electronic form.*"

The task force on archiving of digital information was specifically concerned and focused on: materials already in digital form and in urgent need to be protected against deterioration and technological obsolescence. The possibility of the periodic transfer of digital material from one hardware/software configuration to another e.g. migration from one generation of computer generation to a subsequent generation must be achieved for digital preservation and must be considered as an essential function of digital archives. Some open issues such as costs of storage of massive quantities of information and use of metamedia for digital preservation have to be studied and to find out the best practices.

However, in the Draft Report of the Task Force on Archiving of Digital Information commissioned by the Commission on Preservation and Access and the Research Libraries Group "Preserving digital information. Version 1.0, August 24, 1995" is underlined that "*...digital archives are distinct from digital libraries in the sense that digital libraries are repositories that collect and provide access to digital information, but may or may not provide for the long-term storage and access of that information.*"

In spite of the above mentioned there is a continuos and considerable controversy between those who claim that the future belongs solely to digital information and those who claim that microfilm is the best platform for conversion to future technologies as they develop. The basic idea is that we cannot save the machines if there are no spare parts available, and we cannot save the software if no one is left who knows how to use it.

Most microform producers claim that their microforms will survive for over 200 years. How long CD-ROMs will survive? Data degradation within 20-25 years can be seen as realistic estimate. However, a microfilm or a CD-ROM is useless without a certain level of hardware equipment. What happens if that hardware should become obsolete? The issue is not only preservation, conservation and access to different media but also the hardware environment.

1993 on the occasion of the 59th IFLA Council and General Conference, Barcelona, Spain, Ms. Battin delivered a salient paper with the title "*From Preservation to Access : Paradigm for the Nineties.*" She touched and outlined some issues which are guidelines for all working groups on preservation and access.

"*An important corollary to the development of information technology is the inverse relationship between the stability of the recording medium and the capacity to gain access to information. As the capability to produce a high volume of readily available information increases, the stability of the recording medium has steadily declined. We have moved from a high* *stability, low access environment of stone, clay, and papyrus to a low stability and high access digital world."*

"The history of preservation and the manner in which technology continues to change the way we think about both preservation of and access to information is an illuminating example of the power of technology to change the culture, the organizations, and the basic principles of our society... we have discovered the paradigm of the future virtual library: in the digital world, preservation is access, and access is preservation. The boundaries of the analog world have dissolved."

Access and preservation strategies are no longer incompatible and wide spread access to documents is no longer the enemy of preservationists. In short: preservation is access, and access is preservation. *"However, we must keep in mind the distinction between physical access to documents and intellectual access to published works and their contents. It is ironic that while digital imaging technologies have the potential to increase physical access to documents, these same technologies have no inherent capabilities to improve intellectual access to the works represented in these documents, and may, perhaps, actually diminish such access."* (Charles R. Hildreth)

The requirements for browsing in the digital library of the future are for sure completely different than in the open bookshelf browsing model. The digital world is characterized by a sharp distinction between the carrier and the intellectual knowledge it contains: We must build on the extraordinary strengths of digital information to preserve the best of our heritage while at the same time taking care to enrich and enhance the scholarly work of the generations to come.

It is a fact that a precise search in a digital collection requires from the librarian an understanding of the complexities of search methods and how to navigate in an electronic environment. Librarians are compelled to re-orientation unless they risk their profession. While the forms and media in which the messages of scholarship are found display both change and continuity - being and becoming available electronically -, the role of the librarian with his/her critical liaison function remains the same today as it was in the early 1960s. Librarians are being faced with decisions to place trial subscriptions to electronic journals as many are becoming available in electronic as well as paper format and they potentially offer better value for money than paper journals.

Moreover, there is a new relationship between publishers and librarians, both serving their intermediate role for the international community of authors and readers. However, we have to keep in mind that due to the constant change of technology the life cycle of an electronic format will tend to be shorter than the life cycle of conventional formats. Also publishers have to provide access in electronic form to the worlds literary heritage. Chadwyck-Healey, for example, is making literary databases available including the English Poetry Full Text Database, Patrologia Latina Database, Editions and Adaptations of Shakespeare and Goethes Werke on CD-ROM. Elsevier Science is working closely with libraries on the development of electronic libraries.

Library systems suppliers, in addition, must now focus on the needs of systems to provide access to information in whatever form, however and wherever stored, in whatever it is coded. A new generation system for the global market is more than needed.

More and above all, the following issues are still unsolved and there is no definite satisfactory solution:

How are we going to store digital data? Which electronic data should and/or must be stored? What is the role of national libraries in this game?

It is behind our imagination to know or predict how and where we can store the electronic/digital data? Is it realistic to imagine or think over and about how can we store the data that we can preserve and access in hundred of years hence? How to link the digitized document to the appropriate hardware and software to access the document? Is it the responsibility (sole and only) of the librarians to archive (electronic/digital) published material for ensuring long term preservation or publishers as copyright holders?

It is also the intention of this publication to provide interested colleagues, who did not have the advantage of attending the 18th International Essen Symposium, with information for a better understanding of the problem of Preservation and Access. This publication, volume 20, in the series *Publications of Essen University Library* may add to your standard works information about the latest developments in library and information technology.

On behalf of the organizing committee of the Essen Symposia, we would like to express and extend our sincere thanks and gratitude to all speakers, participants and vendors who made the Symposium a success and encourage its continuation. Without the help and assistance of the organization committee it would not be possible to organize it in its smooth, friendly and warm atmosphere. Special credit is given to Ms. Doris Pohl who shares a great portion of the responsibility for the Symposium.

It was a pleasure and honor for all of us to celebrate and honor one of the great American librarians, Ms. Patricia Battin, as a distinguished colleague and honorary guest on the occasion of the 18th International Essen Symposium 1995.

Essen, January 1996

A. H. Helal

J. W. Weiss

18th International
Essen Symposium 1995

Essen University Library

Electronic Documents and Information : From Preservation to Access

23 October - 26 October
1995

Agenda

Monday, 23 October

10.00	Registration
11.00	Vendors presentation
14.15	Opening of Symposium **Ahmed Helmi Helal**
Chair:	**Ahmed Helmi Helal**
14.30	Great Expectations : The Impact of New Technology on Information Access and Delivery **Frank B. Oliver**
15.15	Discussion Coffee
16.00	On the Relationship of Academic Program and Research Libraries at the Electronic Frontier : Something Old, Something New, Something Borrowed, and Someone's Probably Blue **Anthony M. Angiletta**
16.45	Discussion
19.00	Reception

Tuesday, 24 October

Chair:	**Look Costers**
9.30	Economic Models for Electronic Libraries **Frederick J. Friend**
10.00	The Economics of the Virtual Library in Israel **Shmuel Sever / Eli Simon**
10.30	Discussion Coffee
11.15	A Model Licence for Acquisition of Electronic Materials **Mel W. Collier**
11.45	Acquisitions Policy in an Electronic World **Kathryn Arnold**
12.15	Discussion Lunch break
Chair:	**Klaus-Dieter Lehmann**
14.30	Preserving What We Really Want to Access, the Message, Not the Medium : Challenges and Opportunities in the Digital Age **Charles R. Hildreth**
15.15	Discussion Coffee
16.00	Document Delivery in the 1990s : Current Aspects and Future Trends **Sue Orchard**
16.30	Educating Librarians for the 21st Century **Irene Sever**
17.00	Discussion
19.30	Reception

Wednesday, 25 October

Chair:	**Suzanne Fedunok**
9.30	Electronic Publishing : Availability and Legal Deposits **Kerstin Dahl / Sten Hedberg**
10.15	Discussion Coffee
11.00	Die Deutsche Bibliothek : The National Archive for Electronic Media? **Werner Stephan**
11.30	The Impact of Electronic Publishing on Library Services **Hermann Leskien**
12.00	Discussion Lunch break
Chair:	**Heiner Schnelling**
14.30	New Horizons : Redefining the Equator **Jenny Walker / Martin Fisk**
15.15	Discussion Coffee
16.00	Chadwyck-Healey - Electronic Resources for the Virtual Library **Tony O'Rourke**
16.30	Discussion
19.00	Reception

Thursday, 26 October

Chair:	**Paul Nieuwenhuysen**
9.30	National Self-Sufficiency in an Electronic Age **Maurice B. Line**
10.15	Discussion Coffee

11.00 Emerging Electronic Libraries in Europe : An Introduction into Some of the Cooperative Projects between Elsevier Science and Libraries
Christiaan C. P. Kluiters

11.30 Aesthetics and Quality in Format Conversion
Morten Hein

12.00 Discussion

12.15 Conference Summary
Graham Waters

12.30 Close of Symposium

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18th International Essen Symposium 1995

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The Commission on Preservation and Access*

The primary objective of the Commission on Preservation and Access is to foster, develop and support collaboration among libraries and allied organizations to insure the preservation of the published and documentary record in all formats and to provide enduring access to scholarly information.

Since 1986, the Commission has progressed from an initial emphasis on preserving information in books and journals to exploring approaches to preservation and access involving digital and other technologies.

The Commission was established in 1986 by the Council on Library Resources, Inc., in response to a unanimous request from the members of the Association of Research Libraries. It operates as a private, non-profit corporation exempt from federal income tax under Section 501(c)(3) of the Internal Revenue Code.

The Commission Role ...

The Commission serves as a catalytic agent and convener of interested parties and an advocate for collaborative and visionary solutions. It contracts for research-and-development and demonstration projects; sponsors invitational meetings, and workshops; operates task forces and committees; publishes a newsletter and reports; and provides displays and materials for conferences.

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* Brochure of the Commission on Preservation and Access. Further information: The Commission on Preservation and Access, 1400 16th Street, NW, Suite 740, Washington, D.C. 20036-2217, Phone: (202) 939-3400 • Fax (202) 939-3407

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The Commission is supported by foundation grants and sponsored by *colleges, universities, associations, libraries, publishers and other allied* organizations.

The Commission maintains a small staff. Many programs use part-time consultants, providing flexibility to respond to the changes in librarianship and higher education. Initiatives are established by an elected governing board that meets three times each year.

Initiatives

- Explore the use of emerging technologies for the preservation of and access to scholarly and research resources.
- Collaborate with scholars concerning the preservation of and access to contents of books, journals, photographic collections, and nonprint library and archives resources.
- Maintain a strong capability for responding to preservation initiatives in Eastern and Western Europe, Latin America and other parts of the globe.
- Advocate the sustained and fully funded operation of the brittle books program managed by the National Endowment for the Humanities' Division of Preservation and Access. Serve as an information resource for Congress through staff briefings and annual testimony.
- Catalyze involvement of constituencies including scholars, librarians, technology specialists, the international community, publishers, museums, and institutions of higher education. Develop publications and other information for targeted audiences and programs.
- Advance education for management of preservation and access. Explore the current and future needs of librarians charged with providing continuing access to scholarly information recorded on a variety of media.
- Promote a science initiative to coordinate preservation research activities.

Comments on behalf of the Commission on Preservation and Access

Hans Rütimann
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Deanna Marcum, the new president of the Commission on Preservation and Access - and Patricia Battin's successor - asked me to represent the Commission at this event in honor of Patricia Battin.

I'm very happy to do this since I have known Patricia Battin for many years - when she was Vice President and University Librarian at Columbia University and when I had the privilege of working with her at the Commission since 1988. Her achievements at the Commission are a matter of stellar record: She created it from scratch, with a vision but very little money. Her tireless efforts for the cause - to preserve the intellectual heritage and to ensure continuing access to that heritage - soon attracted funding and an ever increasing number of experts covering a wide range of concerns.

Pat Battin was also instrumental in rallying forces that influenced the increase of the U.S. government's yearly allocation for preservation purposes from $3 million just a few years ago to today's $22 million - a success story not diminished by today's new political realities. It is significant that during the debate with the current congressional leadership, the Commission turned to Pat Battin to provide eloquent testimony on the importance of continued government subsidies for the preservation of and access to our intellectual record.

In addition to recognizing the transformational power of the digital age and its impact on the preservation of the human record, without neglecting traditional preservation concerns, Pat also thought internationally early on. Her one-sentence mandate, "Let's find out what's going on elsewhere," grew into the Commission's international program, with contacts and projects in many countries worldwide.

Pat Battin has always been curious about, and supportive of, preservation efforts in countries outside the U.S. This is why it is particularly appropriate that she be honored with an international symposium on issues she has been leading and will continue to influence. At the Commission, we count ourselves lucky to have Pat continuing to work with us on the ambitious efforts to create a national digital library.

I convey the Commission's greetings and its appreciation that the accomplishments of its founder and former president are honored by the international community.

Great Expectations : The Impact of New Technology on Information Access and Delivery

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Abstract

The British Library has an unparalleled collection of information recorded on every type of medium, and has been a world leader in document access and delivery for many years. Technology developments have assisted the preservation of this collection and, as never before, allowed the British Library to make it available, in electronic form to the world.

This paper will address the challenges and opportunities that new technology offers, using a project which has the internal code name 'DiSCovery' as a case study. The DiSCovery project, on which the speaker has worked for eighteen months, seeks to combine the latest technology and operational practices into a system that has the potential to revolutionise the way users access and receive material from the British Library.

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Advances in technology have enabled the end user to be empowered to carry out their own searching rather than use intermediaries. DiSCovery will enable end users to browse through vast databases for information of interest rather than having to search in the traditional manner.

However, the introduction of new technology frequently challenges many well established infrastructure and cultural aspects of an organisation. DiSCovery and the British Library is no exception and some of these aspects will be considered.

From its inception the IT industry has thrived on 'more for less' - bigger, faster, more friendly but at less cost and the expectation is as great as ever that it will continue. This paper will, therefore, conclude with some comments on the future and how 'great expectations' will continue to be aroused by new technology in the world of electronic documents and information.

1. Introduction

> *Where is the wisdom? - lost in the knowledge*
> *Where is the knowledge? - lost in the information*
> (TS Eliot)

We used this quotation many years ago when I was Head of Information Management with Shell Research, on a poster advertising the then newly created Information Centre. A few days later the poster was 'revised' by someone who wrote

'Where is the information? - lost in the library'!

I took that piece of graffiti to heart!

In my early days as an Information Manager, over ten years ago, I felt that it was particularly important

- to actively encourage end users to do their own searching
- to change the information services we were providing from reactive to proactive.

and introduced policies accordingly.

It was the time when we took delivery of our first Sirius Personal Computer (PC). This was, to my mind, a crucial piece of technology in my desire to turn policy into reality. It clearly offered the potential to put computer power in the hands of end users. For the first time they could create and access information independently of the central computing function.

In the early days of our e-mail service we set up electronic forms so that scientists could pass requests to our local library and the British Library without the need for a printout to be generated. We collaborated in a trial to receive scanned images via a satellite link directly from the British Library. We reallocated costs back to our users rather than being regarded as a site overhead.

As you may appreciate, these initiatives were not universally welcomed. There were strong objections from some information professionals who saw it as a threat to their careers, and from some senior management in the organisation who envisaged their operating budgets for information acquisition running out of control.

During the intervening years there have, of course, been many other crucial developments in technology that have had a significant impact on information access and delivery: vast increases in processor power, high capacity 'cheap' storage, digital telecommunications, the Internet and many more, some of which I will be reviewing in this paper. However, nothing has quite compared with the sense of 'great expectation' I sensed when the first Sirius PC arrived on my desk.

2. Objectives

The objectives of this paper are to review the impact of technology on information access and delivery today and to consider the challenges that may lie ahead. The topic is immense so this paper will concentrate on a project I am currently involved with for the British Library which has the code name DiSCovery. However, in so doing I hope to review many of the key issues that those of us in the information business face today.

DiSCovery is a current awareness system that will allow end users sitting at their PCs to identify information of interest, order copies of that information and have it delivered to their desk tops.

I was responsible for managing the production and testing of a trial version of DiSCovery at a number of commercial and academic test sites, within the UK in the Spring of this year. The work was carried out for the document supply part of the British Library, at their centre at Boston Spa in the North of England.

I will be discussing the technology that we used, the problems that we encountered, and the challenges that remain in turning a trial system into a commercial reality.

3. The British Library Document Supply Centre

3.1 Introduction

The British Library Document Supply Centre (BLDSC) is known to many people, but perhaps only as an address. The following, therefore, offers an impression of the enormous volume of available information, and explains the complexity of this operation at present so that the DiSCovery project can be put in context.

The site at Boston Spa houses a collection of some 250,000 journal titles, 3 million books, 4 million reports in microform, 500,000 other reports, 300,000 conference proceedings, 500,000 doctoral theses and much more. It employs about 750 staff and is, of course, just one part of a complex organisation, but a crucial one in that it generates income for the British Library. It has an outstanding record of preserving this vast stock, increasing it, and in making it available to the world.

One of its strengths is the availability of a vast collection of information located in one place. With over a hundred miles of shelving it embraces technology drawn more from a commercial production line than the traditional library. However, it has also offered the BLAISE online service for many years together with a range of CD-ROM based products.

The British Library is part of the public sector in the UK, reporting to the Department of National Heritage. Like many sectors within the Government it has budget constraints and does not have the freedom to act or possess the deep pockets of a large corporate organisation. It has specific roles to play for the UK, and indeed Europe, and this carries with it associated responsibilities.

3.2 The Existing Approach

Traditionally, material has been requested via intermediaries e.g. librarians, by post or using the various ART communications packages developed by the British Library, retrieved from the shelf and despatched, in the case of loan material, or photocopied and posted or faxed in the case of other material. These requests for copies are handled by a dedicated team of staff who receive the request, locate the material on the shelf, take it to a photocopier or fax machine, copy it, return the original to the shelf and despatch the copy to the requester. Billing is relatively simple using prepaid fixed price vouchers or deposit accounts.

The operation may sound simple but in fact is a complex highly integrated blend of trained staff, using appropriate technology to ensure that the right material is delivered to the right person at the right time.

3.3 Shortcomings of the Existing Approach

However, there are some obvious weaknesses in this system:

- The user has to know what they want before they can order it, although staff at BLDSC have become adept at interpreting requests[1]
- The ordering process requires the services of an intermediary, or the end user to become skilled in the use of the ART communications packages.
- It takes time to locate the required material, retrieve it from the shelf, copy it and return it to the shelf. During this part of the operation the material is effectively lost.
- Delivery is not instantaneous, and as we know photocopies and faxes can be of dubious quality, particularly when coloured photographs feature in the original.
- Billing is inflexible in a world where variable copyright charges are becoming the norm and users wish to adopt a philosophy of paying for what they use.

4. DiSCovery

4.1 Introduction

The challenge of DiSCovery is to build a system that will allow end users to identify material themselves, on their own PC, without the need of an intermediary, order it themselves, again without specialist help or knowledge, have the document retrieved 'instantly' and delivered immediately in a form that will allow a high quality print to be produced locally.

The key components of DiSCovery are a Graphical User Interface (GUI), an index, communication and ordering facilities. The key features of the product are that it will be a current awareness service, be copyright fee paid, have document retrieval and delivery within a predetermined time and include budget control facilities.

[illegible]

4.2 Why Now?

A reasonable question to ask is why should the British Library and indeed other organisations be investing in this type of product now? The answer I suggest is that:

- for the first time the convergence of computing and telecommunications technologies has allowed such a service to be created,
- we are starting to see technology have an impact on the traditional publishing process,
- end users are starting to assume some of the roles traditionally carried out by intermediaries, and
- the growth of informal electronic communications.

4.3 The Trial System

Our approach was to build a trial system consisting of a prototype Graphical User Interface (GUI), a CD-ROM based index, communication and ordering facilities, document retrieval and fax transmission of journal articles.

We sought to link existing components wherever possible as we wished to be evolutionary rather than revolutionary and to use robust proven technology whenever it was available.

Considering each of these components further:

4.3.1 Identifying Information of Interest

Objective

Our objective was to build an interface that could be used directly by an end user, to identify the information they were seeking, without specialist information skills. In particular we assumed that the user would not be familiar with Boolean logic. Boolean logic has, of course, been with us for a long time; it is tried and tested and, perhaps more importantly, well known to information professionals, but we considered that it was a significant hindrance to the casual user.

Approach

The approach that we adopted for the trial was to build a high quality, distinctive PC based Graphical User Interface. We aimed to produce a leading edge, novel interface containing revolutionary searching concepts. We used the expertise of professional designers to generate ideas.

In constructing the trial system our developers used languages such as Visual Basic, which offered us the opportunity to prototype the GUI. It provided us with the ability to develop a number of alternative solutions quickly and to modify the design 'on the fly'. We personally delivered new CD-ROM discs to our trial sites fortnightly, firstly because the ultimate product is designed to offer current awareness, but also to provide a 'latest version' incorporating the latest ideas. The disc also contained an index which will be described later.

The fortnightly meeting also provided the opportunity to get feedback from the end users and their management. We carried out a survey of search engines and selected a well established 'industry strength' product since we felt this would be best suited to searching the vast amount of information in a commercial index of the future.

Key Decisions

It was decided early in the analysis phase to build the trial interface to run under Windows rather than DOS in the expectation that the commercial version would be based on Windows. This in turn was based on the assumption that most of our customers would be using Windows, if not now, at least in the foreseeable future.

Findings

We found that the system required a 486 processor to function effectively and efficiently. I am sure it will come as no surprise to many of you to learn that we found a great variety of PCs at our test sites and even within major companies, many bench scientists, technicians etc. did not have access to PCs with 486 processors and in some cases not even 386 models!

We found that to develop even a relatively modest interface such as ours, which sought to protect the end user from Boolean logic, was not trivial. We also found that a significant number of end users asked us to include Boolean explicitly in the new interface! Prototyping proved to be a very powerful and useful technique.

4.3.2 The Index

Objective

To enable end users to identify information of interest requires not just a GUI but an index.

Approach
For the DiSCovery trial we selected part of the existing Inside Information CD-ROM product. This consisted of bibliographic information from the most requested 10,000 scientific journals catering for the scientific, technology and medical sectors. Though small, this index still occupied a sizeable part of a CD-ROM.

Key decisions
A crucial question that needed to be considered was the richness of the information contained in the index. Sufficient data needed to be stored to enable the end user to identify journal articles of relevance but too much information wasted a lot of disc space.

Users of online services are used to seeing abstracts of journal articles, but the addition of abstracts makes the index even larger, is expensive and requires a lot of disc space.

4.3.3 Ordering and Communicating

Objective
A key objective of our system was for end users to be able to order material easily from within the GUI. The challenge was, therefore, to build an automated ordering facility into the interface so that requesting material was literally as easy as pressing a button.

Approach
For the trial we used a proprietary communications package and modem connection. The communications link was created by running a script file. This was cheap and simple enough for a trial, but too expensive and inflexible for a commercial release.

Key decisions
From the British Library's point of view it was crucial that the communications system talked to the existing infrastructure, so that the requests were sent to the appropriate part of the library, and auditable records could be kept of the orders placed.

4.3.4 Retrieving Documents

Objective
The long term aim is to store and retrieve the information held in electronic form, but that, of course, requires copyright agreements to be made with

the publishers. Even with such agreements the technical challenges are enormous.

Approach
For the trial, requests were routed to a printer at the Boston Spa site located close by the staff who retrieved the documents from the shelf. Pagers were used to alert staff to the fact that a request had arrived. These staff then went to the appropriate part of the collection to retrieve the document.

4.3.5 Delivering Documents

Objective
It is also the long term aim of DiSCovery to deliver information to the desk top electronically in a form that can be printed locally but, of course, that also requires publisher agreement.

Our aim in the trial was to achieve delivery within two hours of the request being received. A key objective was, therefore, to determine how long it would take to deliver the requested article.

Approach
Having retrieved the document from the shelf, staff scanned the article into a dedicated fax station and transmitted to a fax machine at the customer's site.

Findings
Fax machines were not as commonly available as we had supposed and not necessarily conveniently located close to the end users. We found that on several test sites the fax machines were regarded as the property of the administrative department who were most unhappy about having their machine tied up printing our articles. One site even banned their scientists from receiving faxes during the working day!

We transmitted high quality faxes but the ultimate quality depended, of course, on the device that received the image, a classic case of the weakest link in the chain!

4.3.6 Managing the Process

Objectives
A major objective of the trial was to test the ability of the British Library Document Supply Centre to handle the requests quickly. It was crucial that Help Desk staff had immediate access to monitoring information so that

they could check the status of a request. An additional requirement was to be able to prepare statistics for the British Library and trial site management's and also generate pseudo invoices.

Approach
We created our own Help Desk and located it in the middle of the Operations section by the fax station, so that the staff had immediate knowledge of the status of requests.

We developed an integrated management information and billing system using Microsoft Access. Pseudo invoices were produced together with supporting documentation showing who had ordered which articles and at what cost. No attempt was made to integrate the MS Access based system with the infrastructure systems within the British Library such as the finance system.

Findings
The need for high quality, integrated systems to manage the processes was confirmed as was the need to produce detailed invoices that could be checked quickly by the recipient.

For the trial MS Access worked well but the production version will use existing British Library systems.

4.3.7 Summary

The trial proved to be very successful. It confirmed that the technology had reached a point where an initial basic product could be produced. It also demonstrated that the British Library could meet the challenge of retrieving the information requested and perhaps more importantly there was genuine enthusiasm from the end user community at the prospects of such a system. Another interesting finding was that the end users enthusiasm for a current awareness product led to increased interest in historical information.

One unexpected outcome has been the decision to produce a new CD product, outside the STM sector, based on Social Science and Humanities and that will be available early next year.

5. Trial to Reality

> *Between the idea and the reality*
> *Between the notion and the act*
> *falls the shadow*
> (TS Eliot)

During the trial the key technologies used were

- the Personal Computer running the Windows Operating System and search engine
- rapid development languages
- prototyping.
- a CD-ROM to hold the index
- communications hardware and software
- facsimile machines

For each of these key technologies some conclusions were as follows:

5.1 The Personal Computer

5.1.1 Hardware

The trial confirmed that a Graphical User Interface such as we wish to offer requires a high specification PC, not widely available in our potential customer community. It also confirmed that our customers have a variety of PCs, a MAC version of the interface was asked for by one site.

The options to solve these problems are all too familiar, reduce the potential customer base or produce and support several versions of the product including some with lower specification.

5.1.2 Software

As mentioned earlier the use of Visual Basic worked well for the trial but it appears that we will need to use more conventional languages in the production version to improve the speed of response.

The first commercial product from the DiSCovery project will use a conventional search engine, but we will be following the development of leading edge search techniques closely.

The variety of operating systems available on PCs is growing at the same time as the future of well established 'mainframe' systems is being questioned; developments of Windows 95, Windows NT and UNIX will be of particular interest. We did not use encryption in the trial but it is an interesting technology which we are following closely.

5.2 Discs

CD-ROM technology worked well for the trial index which had a fairly simple structure and only contained bibliographic information. However, there was a demand from the user community to increase the richness of the index, to include, for example, abstracts at least for display, if not for searching. If we are to offer a rich index for a large number of journals we will exceed the capacity of today's CD-ROM.

Centrally located online databases are the 'obvious' alternative to CD-ROMs. The technology is robust and has been used for many years. Online databases are better suited to holding vast quantities of information, but are expensive to maintain and still attract high communication charges.

For now, technology offers us the choice between creating a series of fairly small indexes for niche markets or online indexes for breadth and depth.

5.3 Communications

During the trial the communications link worked well when the script file ran perfectly but it was not fault-tolerant. A key question for the commercial product is, therefore, what form should the communications take, how much intelligence will need to be built into the link and where it should reside.

As mentioned earlier we used a high speed modem link to enable requests for articles to be transmitted to the Document Supply Centre. We found that many of our trial sites no longer used modems and if they did they were slow models.

Many organisations have their own Local Area Network or use Wide Area Networks etc. and if we are to exchange information with end users we must have a product that will function within this local environment. Solving that problem is far from trivial not least because technology offers us too many alternatives!

The Internet is spreading and might appear to offer a solution to this particular problem, but not if we wish to offer a guaranteed turnaround time.

5.4 Fax Machines

Existing fax machines and their use within companies are not ideal for the use to which we want to put them. However, there is little choice for a project such as DiSCovery.

As mentioned earlier the long term aim is to transmit full text electronic images to the end users PC for local printing but that is unlikely on a large scale in the foreseeable future since the storage and transmission of full text articles will generate huge files, particularly if colour photographs are included, and will need far higher specification, generally available printers than exist today.

5.5 Overall Conclusions

Technology has provided us with an array of very powerful hardware and software options but none fully meet our requirements - yet!

In all the areas I have described crucial decisions have to be made - to take the latest technology or play safe. Given rapid change it is very difficult to produce a product that does not look obsolete by the time it is released.

Since the end user is the target market it is crucial that the product has a feeling of familiarity.

6. Challenges Ahead

'The compelling image'

6.1 What Technology?

So what may be expected in the future:

6.1.1 Personal Computers

There are no prizes for suggesting that the workstation of today will be the PC of tomorrow and the wristwatch of the day after! The progress of the PC appears relentless but will need to be if we are to offer products such as DiSCovery.

6.1.2 Discs

CD-ROMs
The amount of information that can be stored on a CD-ROM is likely to increase in the not too distant future. There are clear signs that the next generation of CDs may approach 4 gigabyte capacity per side and perhaps within 5 years Blue laser technology will offer twice that capacity.

Hard discs
The cost of hard discs has plummeted in the last few years. If this trend continues it will be possible to attach huge capacity discs to a PC. This could, of course, solve the current problem we are facing of where to locate very large indexes, but maintaining the integrity of information on such as

disc and keeping it current may not be so easy!

Disc capacity may seem comparatively large and relatively cheap, but the huge volumes of data involved mean that it is unlikely that much of the existing collection of, for example, the British Library will be available in electronic form for the foreseeable future. Significant developments in scanning and disc technology will be necessary for that to be achieved.

6.1.3 Screens

We are working on the assumption that, for the foreseeable future, most of our end users, particularly those receiving journal articles, will prefer to read the printed word rather than look at a VDU but advances in screen technology may change that assumption.

6.1.4 High Quality High Speed Cheap Colour Printers

Cheap high resolution fast colour printers are not available today but will probably be with us in the next few years. This is a crucial missing link for products such as DiSCovery.

6.1.5 Multimedia

Recent multimedia developments have shown the tremendous potential that it can offer. In the future it would seem quite reasonable to suppose that you will be able to sample the pleasures of, for example, a nation's sound, film or video archive.

6.1.6 Communications

Significantly higher speed and cheaper communications links will be needed to deliver, in electronic form, a collection such as that which exists at the British Library.

The development of operating systems such as Windows 95 with communication facilities included will be interesting.

Satellites have the potential to reach the majority of the world's population that does not have access to existing communications infrastructure.

6.1.7 The Internet

The meteoric rise of the Internet has, I believe, been another crucial piece of technology in the information revolution. It has had a major impact in the information world not least for increasing the use of e-mail. This has enabled the end user to access information and enter into informal communications with colleagues. However, in its present form it has some obvious problems, not least the ability of the casual user to locate information of interest!

Many organisations have set up Home Pages on the World Wide Web to establish a presence and to advertise, but few offer fully developed services. The recent development of commercial facilities looks set to change that situation.

6.2 Impact on What and Whom?

6.2.1 Publishing

New technology is starting to have an impact on the publishing chain. It threatens to disrupt a business that has changed little in generations by making it relatively easy for 'anyone' to become their own publisher.

Many traditional publishers have their current material in electronic form, and this offers the potential for the development of a set of integrated databases spread across the world.

6.2.2 End users and Intermediaries

We have entered the age of home or desktop shopping. Commodities can be ordered from the home or office, the concept at least of direct selling to an end user is with us and is set to expand.

Historically in the information business there have been a lot of intermediaries between the end user and the information. They were all there for good reason and some will have new roles in the future but many may well disappear.

We found in the trial that the Libraries and Information Centres still tended to hold the budgets for information acquisition but that may also change. A comment we received from an intermediary during the trial was 'using your product makes it is too damned easy to order material'. We took it as a compliment - it was intended as a criticism!

Technology has an impact on the way that services are priced. Subscription based pricing, for example, for an online service obviously encourages end users to make use of a system, but may have a significant impact on the central computing resource.

Invoices must, of course, be understandable and auditable and increasingly in a form that will allow the costs to be reallocated to the department within the company that has incurred the expenditure. Some companies would like to receive their invoices electronically to assist in this process.

6.2.3 Libraries

DiSCovery and products like it are just the beginning of a revolution and this is likely to have major long term implications for organisations such as the British Library.

They will want to exploit their collections and one of the major strengths of the British Library is the tremendous breadth and depth of its collection, not merely paper based, but in other forms, such the National Sound Archive.

Technology will allow the libraries to develop new value-added information services. The role of libraries is, therefore, set to change significantly as is their relationship with publishers.

However, the technology already exists to link databases across the world. If they are established there will then, of course, be no need to hold a vast collection in one place. A user of the digital library of the future need not be concerned about where the information resides.

6.2.4 Conclusions

Technology has come a long way since the Sirius PC. It has enabled us to start on making collections such as that contained in the British Library available to the world in an electronic form.

But it is only the beginning - the challenge remains to make it routine, but I have great expectations that it will be achieved.

On the Relationship of Academic Program and Research Libraries at the Electronic Frontier : Something Old, Something New, Something Borrowed, and Someone's Probably Blue

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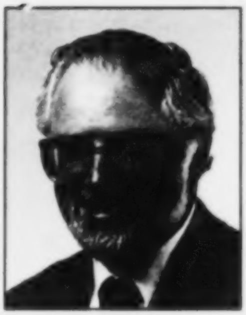

Anthony Angiletta is Assistant University Librarian for Collections at Stanford University. Mr. Angiletta has been involved in collection development since 1975 when he became Bibliographer for West European Social Sciences at Yale University. He also taught political science at the University of Maryland and Southern Connecticut State University for some 21 years. He has conducted two USIA advisories to the former DDR on collections and information access issues, and has chaired three panels on Europe 1992, East Asian scholarly publishing markets, and what does and does not work on the electronic frontier at annual Society for Scholarly Publishing (SSP) meetings. A former self-described "technocretin" he now believes himself "educable".

Abstract

While the forms and media in which the messages of scholarship are found display both change and continuity, the role of the librarian remains the same today as it was in the early 1960s - pathfinder, guide to the perplexed, selector, and practitioner and server of enlightenment. However, the context within which this occurs suggests several metaphors such as "sea change" and the blowing of "winds of change".

This paper examines whether and how the critical liaison function between individual researchers - faculty, graduate students, undergraduates - and subject-, language-, and area-specialists in

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research libraries is changing in the context of bibliographic, source, and other forms of data being/becoming available electronically. Examples of prototypical collaborative undertakings between scholars and librarians and other information specialists at Stanford, including demonstrations of the *Journal of Biological Chemistry online*, SiliconBase (a multimedia database regarding Silicon Valley), will be included as well as descriptions of other efforts with economists and economic historians, computer scientists, and humanists will be provided.

The thesis of the presentation has as much to do with continuity of role as change, and with the dilemmas of resource allocation for organizational administrators and self-administrators.

I. Introduction

This 18th International Essen Symposium is in honor of our colleague, Pat Battin, former University Librarian of the Columbia University Library, and former president of the national Commission on Preservation and Access (CPA) in the United States. Battin, as opposed to important theoreticians and academically oriented scholars of libraries and librarianship such as Herb White and F.W. Lancaster (honored at the 15th resp. 17th Essen Symposium for their own contributions) was one of the first practicing directors of a large American research library to issue a call for fundamental change in the way research libraries conceive of and present themselves. In two clarion articles published in 1982 and 1984[1], Pat Battin spoke not only about the future of the computer in scholarly communications - a role now unfolding dramatically in the arenas of the research process and the research act itself, in teaching and learning, and in the relative flood of bibliographic and factual information we now routinely make available on campus-wide information systems - but also of the structural and programmatic effects that the computer could, should, and would have on the very character of that most interesting societal institution known as the university - at once knowledge producer, knowledge diffuser, knowledge debunker, and knowledge reflector. What was most critical in these two articles for those of us in the profession was a concept of the research library not as a cultural warehouse, but, minimally, an active facilitator and enabler of each of the university's knowledge functions and, potentially, an active participant in knowledge creation as well as dissemination.

Pat Battin had already articulated to some of us in the early 1980s that her concept of the research library no longer could be predicated upon conventional patterns of acquisition and organization. To some extent, this attitude was epitomized by a statement she made conversationally. Paraphrased - for we rely on memory in lieu of documentation here - the statement went "I do not intend to rebuy the collections of Columbia University!" The specific original context for the "Battin Dictum" had to do with microforms - bought commercially or filmed locally - and the then emergent issue of the preservation of damaged or non-acid free print media and the perception of what later came to be called "slow burning fires" or the gradual decay and disintegration of the distributed national collection.

The Battin Dictum stressed the imperative of collaboration at the national level in preserving the intellectual heritage as well as the financial recklessness, if not irresponsibility, of any university librarian's allowing large amounts of increasingly scarce local resources to be used for the purposes of reformatting. This concern, of course, became institutionalized in the creation of the Research Libraries Group microform preservation program and, later, in the mandate and actions of the Commission on Preservation and Access. Hence, while others before and with her had long seen that the traditional autarchic behavior of large research libraries must and would come to an end, and that interinstitutional collaboration and local financial responsibility were intrinsically linked in an environment of finite or diminishing human and financial capital, most proceeded from a perspective that the local option, on any significant scale, did not make sense in a technologically stable climate of cultural production. What Battin, in her foresight, had grasped, earlier than most, was that we were about to enter a profoundly unsettling period where the mode of production for scholarship's creation and diffusion was to challenge many if not all of our received wisdom regarding the what, where, and how of research libraries.

II. The Battin Dictum and Electronic Resources Decisions

On at least three other occasions since 1992, I have been reminded of Battin's Dictum regarding the rebuying of collections. In each case, it was electronic and digital information or formats that prompted my memory. The first involved a visit by a representative of a well-known STM and social sciences publisher, who was visiting large research libraries on an information-gathering mission presumably for the purposes of market research. The main point of inquiry involved the question of research library interest in purchasing backfiles of core or important journals in electronic form. This question has real meaning for all large research libraries where the range of linear feet consumed for print materials each year is 7,000 - 15,000. In a context where many of us find branch libraries at the Weber/Leighton 86% working capacity or higher[2] (a statistical observation which simply does not capture the aesthetic and functional disarray the eye sees in the actual circumstances), and, in the specific context of Stanford, where in 1999, ten years after an injurious earthquake, we will not only celebrate a $40 million restoration of the West Wing of our main library, but, somewhat ironically, need to present to the University administration a request for yet another new storage or auxiliary library - a commercial publisher's inquiry about electronic backfiles of journals and their cultural and economic feasibility, does take on new relevance. However, a variant of the Battin Dictum immediately came to mind on that occasion insofar as the market research envisioned a product sold as a traditional "local option" sale and in a format that, while electronic, was a form of access only minimally enhancing of access - that is, page images with searchable metadata.

The second occasion of the Battin Dictum's invocation involves one of a series of digitization projects, under way or contemplated, at Stanford.[3] In this instance, we refer to the digitization of some apparent prosaic technical reports published in and by our School of Engineering during the last four decades. The largest number of them are in physical danger and, unlike many series of working papers and technical reports, constitute a significant and coherent archive that, *inter alia*, contributes to the documentation of Silicon Valley's development, discoveries and inventions in fields ranging from computer chips to fiber optics, and, indirectly, the character of University research partnerships with the nascent and later burgeoning computer industry. In other words, an archive that constitutes an important piece of the History of Science and Technology in its intellectual, social, and economic dimensions.

The decision to digitize these technical reports is experimental and based on the desiderata of the Commission on Preservation and Access[4]. Here the primary concern is balancing the needs of preservation of the unique content and the costs of enhanced access. In addition, because of the volume of pages and what we might learn with regard to "industrial strength" scanning of existing materials (and its relationship to the several thousand yards of other potential candidates), the decision has been reached to outsource the scanning and produce a "no bells and whistles" reproduction where the only enhancement to access is bibliographic. We do not violate the Battin Dictum because (1) the materials are our own copyright and not in the marketplace, and (2) they are held uniquely as a corpus by Stanford and therefore not subject to duplication or cooperation.

The third instance of the Battin Dictum's relevance arose in the same set of deliberations resulting in the decision to digitize the technical reports and was reflective of a set of attitudes evolved within the directors and the professional staff. Summed, the set of attitudes might be expressed as a series of assertions expressed in the familiar mode leading to actions:

(1) "we're tired of talking about digitization; let's get on with it and do some",

(2) let's predominantly think of digitization, not as reproduction, but as enhanced re-presentation of published data as well as the creation and publication of new data,

(3) let's partner and collaborate wherever possible with the apparatus of commercial publishing in developing new and affordable knowledge products as well as the means of knowledge diffusion, and

(4) let's simultaneously experiment and, where necessary, bring to and influence the marketplace for knowledge creation and diffusion in order to provide economic alternatives for universities now in permanent fiscal crisis; and, if this means breaking down the relationship among the quartet of conventional roles in knowledge production and diffusion - author, publisher, library, reader - then, so be it.

III. Academic Programs and Research Librarians at the Electronic Frontier

The subtitle of this small article includes a feeble attempt at word play and humor. It does, on the other hand, refer to a felt anxiety among many research librarians about their status and role. This, in turn, reflects a continuing balancing act between a project orientation which, while not alien to the librarian, has often been the information technologist's way of approaching tasks, and the librarian's ongoing programmatic orientation[9]. What has been added to and expanded as the crucial tasks of intellectual preparedness of research librarians - their *knowledge of* and *knowledge about* academic fields and disciplines - is the *knowledge how* function in an environment where the material culture of scholarship is undergoing alteration. The critical element for research librarians dealing with *knowledge how* questions in the web of distributed electronic resources at the campus and global levels would seem to be self-evident at least in terms of navigation and knowledge acquisition (the pathfinding role); however, it is also clear that there exists the potential for demonstrating and participating more than incidentally in both *knowledge creation and diffusion*.

For the last 25 years, technology has been a constant element in planning and operations in research libraries. From the concept and material practice of library automation in the early and mid-1970s, *technology in support of the Book* was and continues to be a dominant feature in libraries of all sizes for such matters ranging from cataloging and acquisitions activities in the 1970s to character-based, line-by-line, bibliographic and factual information in the early 1990s to the current rendering of, for example, highly specific literature indexes, and guides to and descriptions of collections on the Web. To some extent, online information has already become second-nature to librarians and obsolescent as a presentation or representation medium.

Many of us have moved to other applications of technology in support of scholarship, including *technology to enhance the Book* which includes fully-marked up canonic or other texts on text retrieval systems, and *technology as an alternative or substitute for the Book*, which includes electronic journals such as the *Journal of Biological Chemistry* produced by the Stanford Libraries, its Highwire Press, and the scholarly society, the American Society for Biochemistry and Molecular Biology. In these latter two applications of technology, we encounter a wide variety of initiatives including projects undertaken by the Association of Research Libraries and a nascent set of endeavors by the National Digital Library Federation. We also, for the first time, find ourselves speaking at more than the "blue sky" level about *technology as a medium for the creation and preservation of new forms of knowledge*. A number of writers since the 1960s have speculated about new forms of knowledge creation and expression for which the computer provides the potential. Among the assertions made has been the limiting, static, and confining character of the linear narrative for both instrumental knowledge and knowledge for its own sake. This line of thought sees the beginning, middle, and end approach to scholarship represented in the Book and products associated with *technology in support of the Book* as closed and inefficient. Even the more dynamic and non-linear reading and reflection that *technology that enhances the Book* or *technology as substitute for the Book* allows may still hamper the creation of new forms of knowledge which are both non-linear and non-incremental; rather, they are continuous, unending and, one would assume, quantal in character.[7]

The vast majority of us have a sure sense of the uncertainty principle and the vagaries of what is real in our everyday life. This is a point upon which poets and physicists agree. For most of us, the excitement and trepidation that we feel and which Pat Battin foresaw has most to do with technologies which enhance or substitute for the Book, which allow one to freely course or, as they say, "surf" about in search of information or data which we may use either for our own edification or in the creation of organized knowledge "clumps" known as essays, articles, and monographs, however multimedial they may be.

The ongoing experience of the *Journal of Biological Chemistry* (the *JBC*) points up both some answers to the question of what we mean by an enhanced vehicle for knowledge dissemination, what we mean by breaking the seemingly fixed role structure of author-publisher-library-reader, what the roles of librarians and technologists are and can be, and what new questions arise. The *JBC* has been and is a remarkable adventure where one can identify that which one wants or needs to read in an environment of efficiency and choice. For research librarians, the *JBC* and other electronic journals and monographs, static or dynamic, raise questions about scarce human resource allocation - that is, how much can be done and how much should be done by research librarians in the creation of a publication. Librarians as autonomous professionals and authors themselves, of course, can and should publish. Librarians as organizational and institutional professionals can and should create digitized products derived from their holdings for which they hold intellectual property rights or have received the requisite permissions. Librarians can and should consult with commercial and non-commercial publishers on knowledge products as they long have, so long as elementary conflict of interest rules are observed. But whether or not librarians as librarians in libraries should be engaged continuously in the continuing production of journals, books, or other knowledge products traditionally authored by scholars and distributed by publishers - well, that is a question worth some discussion.

Notes and References

1 Patricia Battin, "Libraries, computers, and scholarship", *Wilson Library Bulletin*, 56:580-83, April 1982 and Patricia Battin, "The Library: center of the restructured university", *College and Research Libraries*, 45:170-76, May 1984.

2 See Leighton, Philip D., and David C. Weber, *Planning Academic and Research Library Buildings, 2nd ed.*, Chicago: American Library Association, 1986, pp.153-157.

3 Like other large research libraries, Stanford has a number of digitization projects under way. The proposal objectives for these projects are both experimental and programmatic. The general criteria for such proposals are mounted on our internal Web pages and includes the following:

Each project must serve four larger goals:

1 to enhance access to our user communities;
2 to confront the "intellectual context-setting" issues as they relate to electronic access;
3 to give SUL/AIR staff diverse opportunities for hands-on experience in creating, manipulating, servicing and preserving digital surrogates; and
4 to address general concerns of preservation as they related to these collections.

We do not expect that these projects will fully (or even partially) meet all of the access needs and requirements of our users. These projects are likewise not intended as substitutes for other, more conventional forms of access, such as catalog records, finding aids (whether digital or paper), and the like. Indeed, some other form of conventional access via metadata is presupposed.

4 See the CPA Web homepage at URL *http://palimpsest.stanford.edu/cpa* where, *inter alia*, one finds the Commission's most recent statement on its role in the preservation and access of digitized information: "*The mission of the Commission on Preservation and Access is to foster, develop, and support collaboration among libraries and allied organizations to ensure the preservation of the published and documentary record in all formats, and to provide enduring access to scholarly information.*"

Much of the programmatic focus of the Commission is on digital technology, for it is the driving force in many of the changes occurring in higher education today. Preservation remains the primary focus, not because it provides an opportunity to experiment with technology, but because preserving the intellectual and cultural heritage is the unarguable responsibility of all who call themselves librarians and archivists. It is precisely because the technology leads us to new opportunities and tools for meeting that obligation that it has become a central concern.

5. A programmatic orientation, in turn, has never been alien to information technologists who have had to maintain "7X24" computer center programs for more than 2 decades and have had to provide technical and systems ongoing program support for librarian's electronic access-to-information programs.

6. An irony exists insofar as, while obsolescent to librarians and obsolete to technologists, many of our faculty and students have yet to catch up. The generalization about students' intuitively quicker grasp of computer operations is correct; but, if they do not know something exists or are unable to make the connection between the medium and the resident content, intuition is of little use. "BI" unfortunately continues to underline the gap between the "natural" facility of students to deal with machine environments and their level of practical knowledge about what content exists and how it is related.

7. While the speculative literature is well-established, if not persuasive, and the scientific literature is interesting, if not conclusive, I prefer the brief insights on "lineasts" and "optophiles" coined by Alan Robbins where he succinctly and humorously gets at the difference between the research product which is linear and bounded (a novel, a play, an article on DNA), and the research itself (or, at least, its germination) which, while it can be scientific, deductive, and procedural, also can be interactive, discontinuous, and freely associative. See Alan Robbins, "After Dinner, a Communication Taste Test", *New York Times*, January 7, 1996, p.10.

Economic Models for Electronic Libraries

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Frederick Friend is Librarian of University College London, one of the premier institutions for research in the United Kingdom. His earlier career was in other UK university libraries at Manchester, Leeds, Nottingham and Essex. The library he directs now has large holdings of journals and books on paper but like other library directors he is considering how to move resources into electronic publications. In 1993 he co-ordinated an electronic document delivery trial using the SuperJANET network and is currently directing a document delivery project under the national Electronic Libraries Programme. He has published several papers, mainly on future developments in libraries, and is a member of a number of professional committees.

Abstract

Many scholarly journals are becoming available in electronic as well as paper format. Librarians are being faced with decisions on electronic subscriptions. On what basis will they take these decisions, and in particular how can they evaluate the cost and benefits in an electronic subscription? Little experience is available as yet to assist librarians in such decisions, but a tentative model is explored in this paper.

The premise is that decisions should be based upon cost per use. Subjective factors, such as user attitudes towards various formats, will influence decision-making in the short-term but the high cost of journals in any format will lead to an emphasis upon value for money. Neither costs nor benefits are straightforward to evaluate. Various pricing models for electronic journals are discussed in this paper, particularly by comparison with equivalent paper journals and with document delivery services. Also considered are the cost implications for other parts of an institution - e.g. computer centres - in a library's decision to subscribe to an electronic journal. Benefits are considered largely in terms of

actual or potential use. The use of paper journals is notoriously difficult to measure, and although the use of electronic journals will be easy to measure, at present there is little experience upon which to base an estimate of future use.

The conclusion in this paper is that librarians should place trial subscriptions to electronic journals, as potentially they offer better value for money than paper journals. However, librarians will have to evaluate such subscriptions year by year and develop cost-benefit models. Publishers will probably be willing to work closely with librarians in devising a regular means of evaluation.

Deciding to Buy an Electronic Publication?

I would like to begin with a prediction: that within five years every library in the world will have purchased at least one publication in electronic format. The rate at which publishers are now making available publications in electronic format which only a year ago would have been on paper only will result in a flood of such publications. While there are disadvantages to the user in libraries' purchase of electronic publications - such as the need to have the right equipment available - the attractiveness of the new format to users will outweigh the disadvantages and put pressure upon library authorities to make the publications and the equipment available. Clearly there will be problems of availability in the poorer countries of the world, but the access to electronic publications in those countries will be no worse and could be better than the present access to publications on paper. Certainly in the wealthier countries of the world the deluge of electronic publications is at our door. Publishers are already offering libraries such as my own the choice between journals and monographs on paper or the same publications over the Internet or on compact disc. This paper is about the assessment of benefits to libraries in choosing electronic rather than paper. The choice is complex, involving social as well as economic factors, and the choice may be influenced heavily by local factors. This paper will draw upon the local experience at University College London but will attempt to identify questions which can be asked by any librarian in choosing an electronic publication.

The first question we should all ask is one which applies equally to a paper or to an electronic publication, and that is: what demand is there from users of the library for this publication? This is a particularly important question for electronic publications, because the up-front investment in equipment has to be justified whereas the purchase of one more book will not incur capital expenditure. It is also a particularly difficult question to answer for electronic publications, because the level of demand will be influenced by users' familiarity or lack of familiarity with electronic publications. Whereas we can be reasonably confident that when we buy a book, users will know how to read it, we cannot be sure that users will know how to load a CD-ROM, and this factor will certainly modify our predictions of use. I know that I am not the only librarian to have purchased electronic publications over the past few years from pump-priming funds, because demand was not proven, but that approach cannot cope with the large number of electronic publications now becoming available.

Once we have established that there is a proven demand for a particular publication we need an economic model to justify its purchase and evaluate its success once in use. In crude terms I believe that economic model has to be the cost of acquiring and making available a particular electronic publication divided by the number of uses the publication receives or will receive. That crude economic model hides a number of questions which may be very difficult to answer. What should be included in the cost of acquiring a particular publication and making it available to users? The first electronic publication we acquire will inevitably involve heavy start-up costs in staff and equipment. To what extent should these start-up costs be written off against the acquisition of future publications? On the other element in the equation, the level of use may rise quickly to an early peak as users experiment with a new service, or it may get off to a slow start and only peak when our publicity about the new service begins to take effect. If we are to judge the success of an electronic publication we need to find the right point at which to make a fair judgement.

The Elements in the Cost

In constructing an economic model for the purchase of electronic publications, it will be important to identify the various elements in the cost of acquiring the publication. These elements I would define as being:

- the payment to the publisher,
- the cost of hardware,
- the cost of any network connections that are necessary, and
- the cost of staff to receive and distribute the publication.

Each of these elements includes a number of questions which may be answered differently in each local situation, but each should be examined and quantified at an early stage in the decision-making process.

To begin with the payment to the publisher, this payment used to be straightforward. When we purchase a book, we know what the price is. We may have discount arrangements with particular booksellers or subscription agents, but those arrangements for paper publications are generally expressed in a reasonably straightforward way, such as a certain percentage discount if our business with the agent exceeds a certain level. One change with electronic publications is that we may be dealing with the publisher directly rather than through a bookseller. This direct negotiation sounds less complex, but because of the large number of publishers may lead to a variety of different arrangements. Also, when we are purchasing a conventional book, generally we are purchasing that book as a single item, but with electronic publications publishers seem more ready to give discounts if a range of publications is included in the package. So a library might purchase a mix of paper and electronic publications from one publisher at less cost than if those publications had been purchased separately. Further complications in the costing exercise will be introduced by the presence of new intermediaries. My own library is to be a test-site for ISI's Electronic Library Project, through which up to 1,250 journals will be available to us in electronic format. How will we benefit in cost or in service from the presence of ISI, whose services are well-established and well-respected in other areas but for whom this is as new a development as it is for us? The answer is that we do not know the long-term value of an intermediary like ISI but we are keen to find out. Another intermediary in the United Kingdom will be the Higher Education Funding Council for England. This organization, which allocates the government grants to universities, has negotiated contracts with three publishers to supply the electronic text of journals to universities at a discounted rate. Will this discount be higher than we could negotiate separately, particularly for a large university which buys many journals? Again we do not know the answer to the question as yet, but we shall have to find the best purchasing arrangements through experience. While we are gaining that experience it is going to be very difficult to answer the question: what is the price of a particular electronic publication?

After the uncertainty involved in costing the price of the publication, the price of the hardware may seem easy to calculate. However, again libraries will have to enter the uncertain world of discounts and deals. Particularly tempting for librarians will be an offer to supply higher-grade hardware at a lower-grade price. Given the anticipated growth of electronic publications it may be sensible to buy a machine with larger storage than we need now. My point now, however, is that such deals complicate the economic model in calculating cost per use. Likewise with network connections, which will be vital if we are to take full advantage of the electronic publications available, but which can be written off over several years rather than against the cost of one publication. Hardware and network connections are issues which most librarians will remember to include in their costs, because we know that we cannot use an electronic publication without them. Easier to forget, however, are the staffing implications of acquiring electronic rather than paper publications. All libraries have systems and procedures in place to acquire and make available books and journals published on paper. When an electronic publication is in the form of a physical object, like a compact disc, the same procedures may suffice. It can be ordered, accessioned and labelled as if it were a book, although there may be problems in attaching a security tag. If the electronic publication arrives over the Internet, however, our normal library procedures are totally inadequate, and we may have to devise new procedures to order and receive such publications. Even more alarming for librarians is that we will need technical staff to help us use such publications. A book is an object we can see and which we know how to handle; a sequence of digital signals coming into our network cannot be seen and is undecipherable without technical knowledge. Such technical knowledge is not always easy to find and does not come cheap, but without it our payment to publishers for an electronic publication will be wasted. In a large university the librarian can usually seek advice from the institution's computing staff, but that advice may be charged for and would certainly have to be put on a regular footing if the librarian needs help with a range of electronic publications. Re-training existing staff to receive and make available electronic publications may be an option, but whatever the means, any librarian considering the purchase of electronic publications should take the cost of staffing the service seriously.

An Illustration of the Economic Model

In order to illustrate the economic model I am proposing, let us put ourselves into the position of a librarian who is offered a package of ten electronic journals by a particular publisher. The library only takes six of those journals on paper but the publisher is offering electronic versions of all ten for the same price as the six paper copies, say £1,000 sterling. The librarian conducts a survey of users of the six paper journals and finds that half of the existing users would be happy using an electronic version of the six journals. As a conservative estimate therefore he records that as being the number of potential users of the ten journals, although privately he hopes that once the electronic journals are available the actual use will be three or four times that figure, as users become accustomed to the electronic format and as ten rather than six titles become available. For costing in the economic model, however, it is wise to be cautious. So for the journals to be purchased in electronic format the librarian writes into the model 100 users each using the journals on average 5 times a year. Thus far the electronic version looks a very reasonable expenditure: £1,000 payment to the publisher and 500 uses, costing £2 per use, certainly cheaper than document delivery and with the potential for even greater value for money if the use is higher than estimated.

However, the librarian then realises that the publisher wishes to down-load the full text of the journals over the internet on a monthly basis. The library has no spare storage capacity on its existing computer system and the librarian is advised to purchase a dedicated machine to store the text and make it available over the local network. The cost of that machine is £30,000 with a life-expectancy of six years, say £5,000 per annum and on the basis of 1,000 uses another £10 has to be added to the cost per use. Yet this is still reasonably good value at £12 per use. In order to load the digital information and make it accessible over the network, the librarian finds that he has to pay a member of the computer centre staff £1,000 per annum, thereby adding another £2 to the cost per use of the electronic publications he wishes to buy. In this hypothetical situation, therefore, he finds he has to budget for both capital and recurrent expenditure, which - if his predictions of use are accurate - will result in a cost of £14 per use. He should then compare this with the cost of document delivery as an alternative to a subscription, but even if the costs are even the librarian may decide that the hope of increased use and the benefit to readers of immediate access to the publications make a subscription better value than document delivery of selected articles.

It is obvious that some of the elements in an economic model for the purchase of electronic publications will be different from some factors to be considered in the purchase of equivalent paper publications. However, in order to assess the value of electronic by comparison with paper, we do need to adopt a similar approach. To be fair to electronic publications, we do need to be realistic in assessing the cost and use of paper publications. If we refer to the cost of a paper publication, we generally refer only to the price we pay to the bookseller or publisher. There are many other costs which usually remain hidden, such as the cost of shelving a book over a period of many years. If a set of twenty volumes of a journal can be held on one CD-ROM, that will cut the cost of shelving that set by 95%. It is obvious if you think about it, but how often do we include such costs in our calculation of buying journals on paper? A true economic model would also have to include the staff costs of shelving and issuing paper volumes, whereas for journals available over the Internet no shelving or issuing cost will be incurred. I make that illustration not to imply that the cost of electronic journals is necessarily lower than the cost of paper journals, but in order to show that we take for granted certain costs which must be brought out in an economic model. On the use side of the equation, likewise we tend to have very poor information about the use of paper journals, whereas when we subscribe to an electronic journal we can be given very detailed use statistics at very little trouble. Comparing like with like is very difficult therefore.

I find the same difficulty in making a comparison between the costs of document delivery and the purchase of publications, whether electronic or paper. Superficially the cost of document delivery may appear to be the cost of a British Library Document Supply Centre form. Librarians who have calculated the true cost of document delivery have found that such a direct cost is only a small part of the true cost. To take one element which is often over-looked, the cost in end users' time in completing a large number of copyright declaration forms can be a significant factor in the true cost of document delivery. One of the attractions of the kind of site licence deals now proposed by publishers for electronic access is that end users' time will be saved. Indeed there are a number of factors in the economic model which may make electronic document delivery direct from the publishers a more cost-effective option than either conventional document delivery or the holding in a local system of the full text of electronic journals. The cost of local storage of full text is a significant factor, for example, and article-by-article requesting would avoid that cost while at the same time not incurring the hidden costs to the end user in conventional document delivery.

Value as well as Cost to be Quantified

As librarians we are not accustomed to working with economic models of the kind I have described. Rarely do we calculate the total cost of any of our services. Probably we would be frightened if we did. Rarely do we quantify the use that we expect from the publications that we buy. Perhaps again we are frightened by the answer we would find, that most of the publications we buy receive very little use. And yet we still buy them, and our readers expect us to buy them, and if previous generations of librarians had not purchased books which received very little use, great libraries would not have been built up. So while professionalism demands that we should not retreat from the world of economic models and value for money, we should not lose our sense of providing a service to users which cannot always be justified in economic terms. Economic models are useful tools for librarians, but let us hope that they never become ends in themselves. At several points in this paper I have mentioned the interests of end users. It is their interests rather than the result of applying an economic model that should be paramount in our purchasing decisions. In an economic model we can, albeit with difficulty, quantify both cost and use, but what we cannot quantify is value. The academic value of a publication that is used by just one user may justify its purchase even at a high cost. Also impossible to quantify in an economic model is the benefit to the world of scholarship of co-operation between librarians and publishers in the development of electronic publications. Publishers are investing heavily in such publications, and while librarians have a responsibility to calculate the costs and benefits of such publications, we also have a responsibility which cannot be quantified to work closely with publishers in evaluating the success or failure of particular publications. This may involve incurring the expense of a trial year's subscription to an electronic journal and evaluating user reaction. Publishers may have raw statistical information about the use of journals online, but librarians can discover the subjective information about user reaction which will help the publisher in designing future electronic publication. The value we can add to the future of scholarly communication is to help publishers to know which electronic publications will be used by the academic community. Such co-operation will, I know, be valued by publishers and may help to avoid the continuation into the world of electronic publication, the confrontation and misunderstanding there has been between publishers and librarians in the past. On that optimistic note I end this paper.

The Economics of the Virtual Library in Israel

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Eli Simon is Development Librarian, University of Haifa. His background is engineering, quality assurance and librarianship. He has drafted several grant applications and budget proposals for digital library projects and publishes an internal newsletter, where he updates staff on digital library developments.

Abstract

The University of Haifa Library is developing a virtual library. It aims to bring digital resources to Israeli library users. Currently, only the universities in Israel are networked. We propose that a national system of college, school and public library networks be created as an essential prerequisite to enable equal access to

educational resources by the information-poor sectors of Israeli society. This could improve their socioeconomic position, thereby enhancing political stability. To this end the University of Haifa Library has proposed several projects: 1. A digital library of Hebrew periodicals, where scanned full images of articles, connected to an index, will serve networked students. 2. Electronic reserves that will provide required reading materials for University of Haifa users. 3. A digital slide collection that will make 160,000 annotated slides available to all interested users.

Raising the funds for such projects needs much effort, in face of rising expenses, technological change and diminishing budgets. Regarding networking as a national priority should lead to government funding. Our library has submitted several grant applications this year; one was rejected, and the others are pending. The development of a virtual library needs state investments, as this could lead to far-reaching benefits for a developing country like Israel. As in past ventures, lack of resources might influence the pace at which University of Haifa Library projects are carried out, but not our determination to proceed with or without external funding.

Introduction

What is the definition of a virtual library? One might be: the organized structure that provides users with intellectual and physical access to worldwide networks of information, displayed in multimedia digital formats. Another definition could be: a range of services and collections made accessible through networks that reach beyond the individual campus.[1]

The University of Haifa Library is developing a virtual library, to be accessed by all Israeli users who have access to networks. What do we mean by this? We see it as organized access to Israeli and worldwide networks, to CD-ROM and online databases and to full image databases.

Is there a need for a virtual library in Israel? Widespread knowledge is essential in a democratic society. We believe in the potential of the virtual library to make information sources available to a wide audience. Retrospective print resources, such as back issues of periodicals, are accessible only to a relatively small group of users, and at a great retrieval effort. Digital

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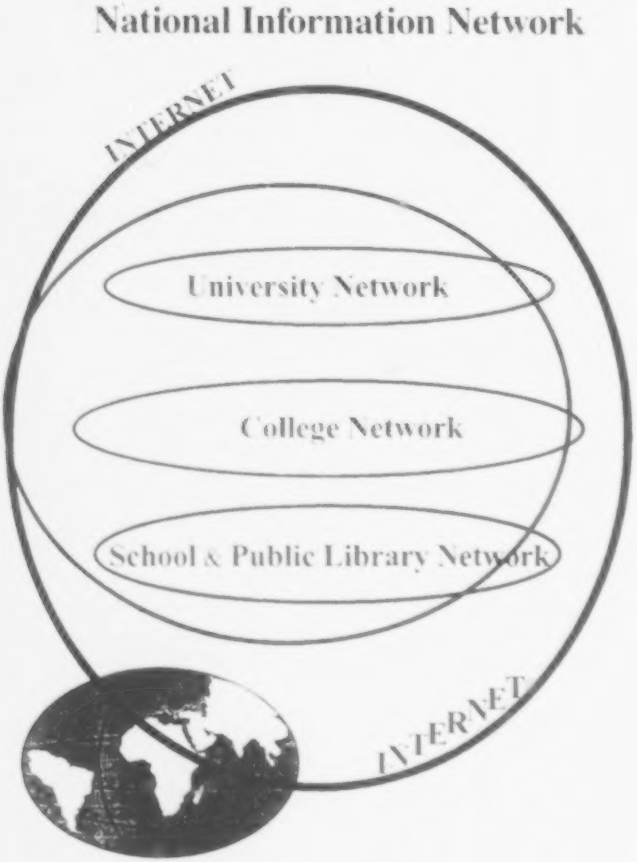
National Information Network
INTERNET
University Network
College Network
School & Public Library Network
INTERNET

Figure 1

resources are mainly available to university users. What can be done to broaden access on a national level? The University of Haifa Library proposes that a national information system, including college, school and public library networks, should be created (**Figure 1**). In the meantime, we are creating and planning our own digital resources, which, in time, will be made available to Israeli users.

Is the cost of these efforts economically justified? Can benefits be related to any aspect: academic, social or political?

National Information System

Israel tries to provide equal opportunities and a decent standard of living for its citizens. Education and access to information are instrumental for these purposes. Many entry level jobs demand a Bachelor's degree. Higher education improves the chances for a better socioeconomic position. Still, gaps do exist, because parts of the Israeli society do not have access to modern information resources. Some affected groups tend to develop fundamentalist orientations: ultra-orthodox Jews and Moslems. Add nationalistic orientations, and you get extremist factions, who tend to violent measures, like Hammas or Kahana followers. These, in turn, may cause political instability. It is up to government level officials to recognize this pattern, and to set a national priority to invest in the dissemination of knowledge. The cost-efficiency of a digital library lies in its potential to boost the well-being of those demographic strata who need it most. A national information system is the tool for equal access to knowledge, that may be otherwise inaccessible. This kind of system requires government investments in computer literacy, a technological infrastructure like ILAN (Israeli University Network) and the Internet. The college libraries network is another essential element.

College Library Network

The University of Haifa Library provides consulting services to the Ministry of Education, for the establishment of a college library network. This network will hopefully enable access, among others, to University of Haifa Library projects: the Hebrew journals and electronic reserves. Creating this network from scratch would offer an opportunity to use current library service ideas.

Many college students, because of their socioeconomic background, need enhanced support to reach university entry levels. It is up to the colleges to provide this support in an affordable manner. This policy is encouraged by the Planning and Budgeting Committee of the Higher Education Board. The colleges mostly serve town and rural populations, enabling individuals to study while keeping their jobs and homes. Most of the colleges are academic extensions of one of the Israeli universities. The student capacity of the universities is limited and tuition is high. The greatest share of a university's budget is spent on salaries. The cost for teaching by university faculty is high: professors teach a limited number of hours a week, with the remaining time devoted to research. They also receive benefits like sabbaticals and continuing education funds. On the other hand, college teachers, could spend more of their time teaching, thereby enabling lower expenses. College students usually come from an economic background that makes individual payment for university studies difficult. They also need more instruction hours and more multimedia demonstrations than their university peers. This requires a different allocation of funds. This may be done, in part, by saving the cost of building traditional libraries. The impracticality of continuing to build large, costly, warehouse-type structures to shelve printed materials, thus replicating collections which exist elsewhere, causes one to question whether established practices can be continued much longer[1]. The example of the Achwa College may serve as a case in point. Originally the plan for a new library called for 3,000 square meters of built space at a cost of $6,000,000. Stressing the diminishing need for shelf space and the growing need for staff training, a revised $200,000 modification in the existing building was suggested. Purchase of computer technology and staff training added a relatively small expenditure. The money saved will help to develop other educational needs, thus serving a national purpose.

What does the literature have to say on creating a virtual library?

Current Projects

We have tried to look for some answers in the printed and electronic literature. There, one can witness the divergent trends, which create the dilemma of today's library manager: sophisticated needs of the information user, intertwined with a spiraling rate of technological innovation, are a typical aspect of today's library service. A severe limitation on monetary resources is another aspect. How do libraries solve this dilemma?

We have found that research about various aspects of funding digital libraries is being carried out. None of these projects have come up with tangible results. We could only check them for relevance to our situation.

Some of the points that we take into consideration when creating our virtual library are:

[1] Publications of [illegible] Library, [illegible]

1. Cost criteria related to libraries and the Internet:
    - program planning and management
    - connectivity, including computer, telecommunications, line, staff and maintenance costs
    - facilities upgrade and maintenance
    - navigation and access, including software and site license costs
    - training and education costs
    - content
    - research, development and evaluation
2. Enhanced access for users, compared to print
3. The cost for libraries to be no higher than print, and the revenue for publishers to be no less
4. User usefulness
5. Enhanced academic productivity

These points, taken from ongoing projects, serve as guidelines in the context of the socioeconomic reality in Israel. Our virtual library is expected to have a social and political impact, in addition to an educational one.

What are we trying to offer?

Haifa Library Projects

The University of Haifa Library is planning several projects:

- Electronic Reserves: The reserve department contains required reading materials for University of Haifa students. Its offprint collection needs much maintenance and photocopying. We are in the process of creating a digital database of scanned images of article reprints. This will preserve the material and make it available for a multi-user student population, not only at the University, but on the planned college network. Adherence to copyright and fair use is ensured by indexing the articles only by course and lecturer, not by journal title. The economic value of this project is in the widespread use made possible by a onetime investment.
- Digital Library of Hebrew Periodicals: The Hebrew University of Jerusalem has set up an experimental project in this field. This is

Snunit, an OCR database of articles from several Hebrew journals and numerous research reports.[illegible] This database is currently limited in its scope, but its ASCII representation, although less convenient for viewing, enables keyword searching. Still, Hebrew journal articles are an important primary source, mainly for college students. Scores of regional and teacher colleges, that are greatly dependent on Hebrew material, need much broader coverage. The University of Haifa Library periodicals collection holds about 20% Hebrew titles. College students need enhanced access to this portion. Seeking articles from back issues of certain Hebrew journals is often tedious. Not all issues have been preserved and indexed. Permission from publishers to scan old material seems easy to obtain; it is not profitable for them to reprint the requested quantities for a relatively small user group. Our planned full image database will prove its cost effectiveness by requiring a relatively small one time and ongoing cost, and being useful to a relatively large user population. We plan to scan articles from the major Israeli periodicals (about 300). The article images will be linked to the Index of Hebrew Periodicals, and at a further stage, may be OCR'd for searching. Thus, a new facet of user interface and search will be made possible. Fair use of new issues shall be agreed upon. The economic value of such a service is widespread and easy access to articles, combined with savings in time and manpower. The current cost might be higher, but future use will spread the investment.

- Digital Slide Collection: Currently, our 160,000 Art and Archeology slides can only be accessed in a quasi open shelf system in the library. Scanning them, and creating a digitized hypertext linked database, will make them and their accompanying text available, in principle, worldwide. The cost effectiveness of the project is based on distributing a one time expenditure for the benefit of many users.

How can these University of Haifa Library projects be accessed? We tend to think that networking is the answer.

How do we plan the funding of these projects?

The Israeli Scene

First, we should familiarize you with the economic scene of libraries in Israel. Some of our expenses are common among European and American libraries; other expenses are indigenous.

Our cost increases for library acquisitions may theoretically reach 25%. This is composed of:

- 10% Israeli annual inflation (moderated by a steady US dollar in the last 3 years). This is usually compensated by a budget increase.
- 15% world price increase for library materials. It is difficult to receive compensation for this item.
- For many years now, our real purchasing power is devalued by a 17% VAT (Value Added Tax). This tax must be added to any local payment for books and journals.

Thus, any program that can minimize these factors may be welcome. Here the considerations of electronic media are in order: sharing information and even the physical presence of material. For instance, the cost of postage and packing (about 7%) may be saved.

Two relatively new cost factors are: CD-ROMs, as an external acquisition item, and staff and user education, as an internal expenditure item.

CD-ROM: extensive proliferation of titles and the undoubted added usefulness for library users lead to an increase in CD purchases. The advantages of this media are Boolean searching and multi-user access. As the number of users increases, the cost of an information item per user decreases. Further savings are expected on the user's time, as has been investigated in the ELINOR project at De Montfort University[10]

Acquisition of CD-ROM titles to replace print editions has increased our expenditures by a range of 125% to 450%. One should remember that this refers to one paper copy versus a 30-user license. In the case of microfilm, the transition to CD-ROM is 50% cheaper. Our policy is to gradually phase out print versions for every CD-ROM title. Currently only two titles are purchased in both versions. This expensive duplication is necessary as a transition, in cases where users must still have a choice of formats. The CD-ROMs at the University of Haifa Library may be accessed on our library LAN from any PC.

Staff and user education: this is a significant, ongoing, digital library cost factor. Frequent changes in technology require much individual training. For instance, in our library, we recently adopted a new version Aleph 3.5, for our OPAC. This transition demands both staff training and preparation of user instruction manuals and classes. Individual guidance is necessary for our library staff who are also subject collection developers and central gatekeepers for the users. They have been encouraged to prepare topical home pages of Internet resources on our WWW server. Library staff constantly advise library users in the use of Internet resources, which may be accessed currently from 15 public workstations and all staff workstations and terminals.

Funding

Reviewing this list of local and global budget encumbrances, one can see the need for carefully planning the allocation of library funds.

How does a library like ours go about its quest for funding resources? One source is the University of Haifa Library budget. We are also trying to obtain government funds by submitting grant applications. Here we must compete with institutions more appealing than libraries, stressing the national importance of our proposals.

Grant Applications

In Israel, research and development of digital libraries has received some priority by the National Committee for Information and Communication Infrastructures. Investment in R&D is regarded highly cost-efficient and conducive to world competitiveness. We applied for several Ministry of Science grants. Our March 1995, $1.5 million - 3 year, digital library research proposal was rejected.[10] It stressed research on user preferences, but human factors and ergonomics were not perceived by the committee as basic research in the field of digital libraries. This may be indicative of the prevailing bias for technology versus the user.

In an effort to stress the possible national benefits of our proposal, the author met the Minister of Science and Arts, Mrs. Shulamit Aloni. She gave her approval for submitting another grant application, this time for a digital library of Hebrew periodicals.

The second grant application, submitted in June 1995, by the Haifa University Library[11], outlined a specific proposal for a digital library of Hebrew journals. This $2 million - 4 year grant is currently under consideration. It is unique, since it attempts to create digital accessibility to the full image contents of 300 major Hebrew journals. The proposal links the images of these journal articles to their bibliographic entries in the Index of Hebrew Periodicals. The IHP is an 18 year old, ongoing Haifa University library computerized project. Building the database calls for the following expense breakdown:

- 20% for hardware and software - scanner, computers, scanning software and file servers
- 25% for manpower - librarians and students
- 55% for operation - licenses and maintenance

The expense for licenses presents some uncertainty. There are no existing modes for agreements between publishers and libraries concerning an electronic journal database in Israel. This has still to be investigated and formulated. We expect different rates for current issues and back issues. This project will enhance the availability of Hebrew journal articles to all Israeli University users. It has the potential of being used by Israeli colleges, and public and school audiences, as soon as they connect to networks.

In addition to basic research, the National Committee for Information and Communication Infrastructures is also prepared to fund demonstration projects. Their purpose is to accelerate Israel's expertise in digital libraries. To seize an appropriate opportunity, in September 1995, the Haifa University Library applied for a $150,000 - 12 month grant for a test and demonstration project for a digital library of Hebrew periodicals.[14] The limited time and budget dictate a coverage of the 40 main Hebrew journals. This project is also still under inspection. The value of this project is in its potential contribution to Israeli University libraries (already networked and Internet-connected) and to college, school and public libraries, that are not yet networked.

Conclusion

The Israeli virtual library is in the making. Our search for models abroad brought no ready-made solutions for Israel. The University of Haifa Library has had to come up with its own proposals. Building a university and national cost model is an ongoing process, in a changing, multi-factor environment.

The basic funding for these plans must come from state resources, not from a single library. Government, university and other financial resources are essential for funding Israeli digital libraries. A network of school, public, college libraries, connected to the existing university network, is not a far-off dream. It is the necessary infrastructure for a country like Israel. The benefits of this could be far-reaching.

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A Model Licence for Acquisition of Electronic Materials

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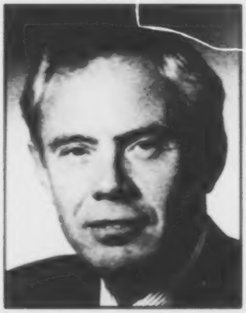

Professor Collier is responsible for libraries, computing, networking, media services, teaching and learning development and staff development at De Montfort University. He has wide experience of libraries in higher education both in universities and polytechnics and has been active in research and development of library information technology from involvement in early real-time system development to research with microcomputer-based applications. His current interests include the management of teaching and learning in the expanding university sector with particular reference to electronic library concepts and multi-media. He is very active in library research and development in Europe, currently working with partners in France, Belgium, Ireland, Netherlands, Germany, Denmark and Hungary.

Abstract

This paper describes the development of a family of electronic library projects at De Montfort University including: ELINOR, the first UK electronic library project; ELISE, the European project to develop interconnected image banks in libraries; ELSA, a European SGML project and PHOENIX, an on-demand publishing project in the UK E:Lib programme. The copyright and licensing issues arising out of these projects, particularly the ELINOR project are discussed. The negotiations with publishers in the ELINOR project have resulted in a model agreement which is increasingly being accepted by publishers and which streamlines the negotiation process. Finally mention is made of initial progress being made towards a model agreement for images.

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Introduction

Making materials published in journals and textbooks accessible through electronic libraries raises significant copyright issues. At present, to reproduce materials electronically, libraries are required to obtain the rights owners' permission - a not insignificant task in terms of building an electronic library. Approach several different publishers and there will be several different responses or at worst no response at all. Without a legal framework for the electrocopying of copyright material, publishers are rightly cautious about the release of electronic files, which can be merged, edited, copied, stored, distributed on the networks, or re-published as new products without their permission leading to unfair use of an author's work. The negotiation process leading to a licence agreement is, therefore, long, cumbersome and has no guarantee of success. Yet several organisations including the universities of De Montfort[1], Carnegie Mellon[2] and Tilburg[3], have begun to build electronic libraries by obtaining permission and paying the necessary licence fee.

Most of these electronic library projects were underway when the only workable solution was to enter into licensing arrangements on a per publisher basis. In the last year, however, the copyright debate has become more structured and vocal. Libraries, publishers, rights experts, collection agencies, academics and other copyright players are gathering to discuss the issues at focus groups, including the recent Aslib "Copyright in Multimedia" summit meeting held on 18-19 July 1995 in London,[4] the European Bureau of Library Information and Documentation Association (EBLIDA) Workshops held earlier this year in various locations including London and Glasgow[5], and the Austrian Computer Society's "KnowRight 95" International Congress on Intellectual Property Rights for Specialised Information, Knowledge and New Technologies held 21-25 August 1995 in Vienna.

Meantime the European Union (EU) has achieved an important step towards harmonisation of copyright legislation in all its member countries by the development of directives protecting the rights of performers, broadcasters and recording companies, software and database producers. In addition, the EU is preparing a Green Paper on "Copyright and neighbouring rights in the Information Society" which sets out to be a discussion document on copyright issues and will invite comments from interested parties with a view to defining a policy programme[6].

In the United States, the Information Infrastructure's Task Force's Working Group on Intellectual Property Rights has made its recommendations in the Green Paper of July 1994 and has subsequently sponsored the Conference on Fair Use meetings bringing together libraries, authors and publishers.

As a more appropriate legal framework evolves, at the same time publishers strategies are changing. For instance, at the ELVIRA conference Academic Press announced their APPEAL electronic subscription scheme[6]. Elsevier's experience from the TULIP project (http://www.elsevier.nl) in the United States has led to a new electronic licensing scheme, which was announced in a press release dated 23 February 1995[7].

Networking and licensing information for electronic libraries, it seems will become an easier task as publishers respond to user needs. This paper describes the experience of one university which has been carrying out extensive electronic library work over the last three years which has been instrumental in bringing us towards workable model agreements for electronic text and images.

Projects at De Montfort University

At De Montfort University we have developed a family of projects aimed at promoting the concept of the electronic library, understanding how it will be used and assessing its impact on users. Projects are funded by a range of sponsors including the British Library, the European Commission, the UK Higher Education Funding Council, IBM, and others.

ELINOR

The ELINOR (Electronic Library and Information Online Retrieval) project[8] is concerned with developing the electronic library as a teaching, learning and study environment for higher education in which information and learning materials are held primarily in electronic form. The project uses document image processing technology to produce a pilot electronic library. Key texts are scanned into the system with agreement from publishers and retrieved and presented to the student using high quality document image software. A two year pilot phase has just been completed and a new phase is starting in which the project will be scaled up, knowledge gained will be applied, and techniques developed further.

The project has been successful in gaining the co-operation of a substantial group of publishers, probably more than any single university project in UK. Publishers have given approval for their works to be scanned and held for reading in electronic form. The major potential usage and benefit emerging from the project is the development of intensively used collections - the electronic book reserve concept.

ELVIS

The ELVIS (Electronic Library for Visually Impaired Students) project takes the document imaging technology developed for ELINOR and applies it to the needs of visually impaired students. Special user interfaces are being designed with large font presentations of text and audio outputs are also under development. Perhaps somewhat belatedly there is an upsurge of interest in higher education for the development of facilities for students with special needs and the project is a good example of a very positive benefit technology can bring for the visually impaired.

ELISE

The ELISE (Electronic Library Image Service for Europe) project funded partly by the Commission of the European Communities (CEC) has developed a prototype for interconnection of full colour image banks held in libraries in the European member states. The partners are De Montfort University (co-ordinator), Tilburg University Library, the National Art Library at the Victoria and Albert Museum, and the IBM UK Scientific Centre. We now have two operational image banks: the De Montfort/Victoria and Albert image bank and the Tilburg image bank. The project deals with some major technical issues to do with image quality, resolution and bandwidth, image retrieval and database design. The design is based on a metadatabase approach whereby users will be able to retrieve and display images irrespective of the image bank location and the database management software under which the image bank is operating. In principle it is immaterial whether image banks are located on a local machine, on a local area network or indeed anywhere on the Internet. Software conforming to Z39.50 has been written to provide connectivity and retrieval across the image banks. ELISE is important because it starts to address issues in image management in libraries which have been neglected compared with textual document management.

The European Commission has now approved our proposal to develop this prototype into a fully operational resources image network for European Libraries. It is hoped that the network will provide a huge distributed resource of images for use in teaching, learning and research. There is great potential of downloading of images for use in teaching packages and student assignments. Facilities for copyright clearance charging and rights protection will be provided.

ELSA

The primary aims of the ELSA (Electronic Libraries SGML Applications) project(8) are to provide an Standard Generalized Markup Language (SGML) based document delivery system to librarians intermediaries and end users and assess its impact. The ELSA consortium involves Jouve Systémes D'Information (France) (co-ordinator), Elsevier Science, and De Montfort University. The project is also partly funded by the CEC. The consortium operates as a team, each member having specific roles which contribute to the overall aims of the project. Elsevier's prime role is to make some 5,000 documents available encoded in SGML for the project to use. In addition they provide the Document Type Description (DTD) to be used for the articles. Jouve are creating the server environment in which the materials reside and are developing management and access control mechanisms. De Montfort University (DMU) is developing the client applications and testing the effectiveness of the system from the point of view of both librarian intermediaries and end users.

The research work involves development of an end user prototype system to test out some ideas on the use of SGML encoded documents in the library environment. This has included an assessment by the team of the problems of existing document delivery techniques and a discussion on how the use of SGML encoded documents at delivery level through an appropriate display mechanism could benefit the user community.

We can see already that ELSA offers radically different ways of supplying and presenting academic material to users. Articles will be made available in batches from Elsevier complete except they will not be paged as part of a journal issue. The content of journals will be represented on the system but the journals will not appear as such in the traditional form since the items are individual articles and not part of a collection of articles made by an editor to be bound as a printed item. The librarians will then be able to create "virtual journals" for end users available on demand. There is scope within this type of on-demand publishing operation for the library to be a key player in the information chain, but users may equally well interact with the databases themselves. If publishers make documents available within large scale databases we could see the disintegration of the journal as we know it and the formation of the personal journal through the daily delivery of new material defined by the users own needs profile. One view could be of the "virtual journal" while another attitude might be seen as the "disintegrating journal". There are those in the academic sector who believe that the whole current process of communication will be transformed by an academic do-it-yourself process.[11]

PHOENIX

PHOENIX is a project funded by the UK Higher Education Funding Council aimed at exploring the uses of on-demand publishing in university libraries. The project partners are South Bank University (co-ordinator), DMU and Huddersfield University. The main objectives are:

- To improve the flow of course material and text to students as part of an integrated operation, whether through pre-packaging or directly delivered to screen.
- To enable libraries to present an integrated course support service with alternatives for the user which are both economic and improve delivery.
- To provide systems, procedures and models which will be generalisable and transferable between institutions, through open systems and standards for delivery and presentation.
- To understand and improve relationships between authors, publishers and rights owners, and to receive indications of the impact of on-demand and custom publishing on their products and income.

These objectives will be progressed through four key tasks centred on South Bank and De Montfort Universities.

- Establish an operation to build and deliver pre-assembled course packs as an integrated part of a selected number of courses. Document management and production software and standards will be researched. Pricing and retailing issues will be explored in conjunction with campus booksellers.

- Build a prototype Web server accessible by students, delivering material either explicitly or as a browsable open learning tool. Management and accounting software to monitor printing, usage and royalty fees will be developed. The system will interface with library management software, allowing access to the catalogue and reservation of library stock.
- Develop, test or configure, as necessary, copyright clearance systems to automate clearance procedures and provide publisher feedback and accounting.
- Establish prototypes at South Bank, De Montfort and Huddersfield Universities, to promote the concepts and evaluate user and academic reaction within the Universities.

Licensing Issues which have Emerged from the Projects

Downloading

Under what terms, if at all, may the user of the electronic library download material?

Printing

If printing is allowed, how much material may be printed and at what cost?

Protection

What functions and facilities can the electronic library operator provide to prevent infringement of the licence?

Authentication

How will users of the electronic library be identified and authorised to use the electronic library?

Watermarking

How can the ownership of copyright be indelibly marked on the electronic material?

Manipulation

What measures are available to prevent unauthorised alteration of the material? This is particularly sensitive for images and artistic works.

Publisher feedback

What facilities are available in the electronic library to provide usage statistics for publisher feedback and payment purposes?

Clearance

Are there facilities available to provide electronic material which is copyright cleared and provides assurance to the electronic library operator?

Pricing

What are the options for reasonable and realistic pricing schemes for electronic materials?

Charging

On what terms may the users of the electronic library be charged for usage or access and what technical mechanisms exist to manage the process?

Licensing

What are the options for licensing material at document level and at institutional, consortium or national level?

ELINOR: Negotiating Agreements

ELINOR started when there was not the same level of constructive debate about electronic copyright as there is today. We wanted to develop a prototype electronic library and gain technical and operational experience at a time when there was no recognised infrastructure for gaining permissions, so we embarked on a programme of establishing a series of bilateral agreements. To a certain extent therefore the project aimed to stimulate responses from publishers on an individual basis, when there was no prospect of a collective response.

Until licensing becomes more prevalent De Montfort University intends to go on negotiating licences on a per publisher basis. The individual negotiations ensure that all participants: publisher/university/user are reasonably protected financially. The drawbacks of ad hoc negotiation are that it is time consuming and results in a range of different agreements with different charging mechanism. The ELINOR project's successful collaboration with publishers may partly be explained by the fact that it is an experiment with a limited number of terminals, and that it can monitor and control use of electronic information.

The agreements specified which titles can be used, for what purpose, and in some cases, for what price. Conditions for usage were also set, for example, no electrocopying by our readers and printing of pages was limited. In return, the project team undertook to provide regular statistics on the use of textbooks and journals, which included details of which documents were "opened" and for how long, which pages viewed, pages printed and royalty charges. A usage statistics collection and management system and a printing control system were developed in-house to meet these requirements. None of the publishers, however, was able to supply electronic files, hence the printed copies of textbooks and journals are usually scanned page by page and held in image form in the document database.

Scaling up the ELINOR system which is now being extended both in terms of subject coverage and network access, will be our biggest challenge so far in publisher co-operation. The document content is being extended to meet the needs of all undergraduate courses within the institution and the access points which were restricted to the Milton Keynes site, are being extended to the main campus at Leicester. As part of this scaling up exercise the project team are developing a model licence agreement.

Model Licence Agreement

We have enough experience from the pilot to develop a standard licence agreement to speed up the negotiation process. This document was drawn up in collaboration with one publisher (Edward Arnold) and will help to negotiate effective agreements with future publisher partners. The working document prepares both parties, the University and publisher, regarding the purpose of the project, the networking and rights of access within a multi-site organisation, describes the role of the two parties, the conditions of usage and reports, furthermore, it prepares the way for discussion on the financial implications. The agreement is already generating useful feedback from publishers. The draft of the model agreement was recently used as a discussion document at the recent European Bureau of Library Information and Documentation Associations (EBLIDA) workshops in London and Glasgow in January 1995 [4], the aim of which was to encourage delegates to discuss a draft model agreement between electronic information provider and library. A version of the model agreement is included with this paper as **Appendix 1**.

Copyright Control, Usage Tracking and Reports

From the outset of the ELINOR project, the team placed security and copyright management, including good auditing of document usage and royalty payment features, as priority requirements of the system. Access to materials is restricted to authorised users, that is, registered students and staff in the University. Authorised users log into the system with their own identifiers. The copyright material is held securely on the electronic library server and unless the user has the appropriate authorisation, the document cannot be copied from the server or manipulated by the user.

The licences of course, stipulate no electrocopying by our readers and, in some cases, printing is limited. However they permit the University to convert the printed material into image format for the purposes of storage and retrieval in the electronic library system. Image files represent a reasonably secure means of using electronic documents, because images can easily consume the space of a floppy disk if downloaded, and the text cannot be altered with a text editor. Extraordinary use such as the downloading printing of large files can also be monitored. Near all the in-house workstations which are located in the library, there are copyright notices, which caution against downloading of the electronic works.

Under a windows environment, it is possible to capture images page by page by means of screen dumps and there are cheap optical character recognition (OCR) tools which will convert the images to machine-readable text, but it is a time consuming process for the user to "clean-up" the errors in the OCR'ed text and is, therefore, a deterrent.

Copyright monitoring and handling royalties is a very important aspect of electronic library development. Some in-house programming was necessary in order to track usage in the ELINOR system. The usage statistics collection program logs all files opened including pages and filters out the usage data in order to produce reports for the publishers and for project evaluation[12]. In the longer term, such statistics will assist libraries in determining the strategy for archiving unused or underused documents, document retrieval and system load. Usage data on a large scale may also be useful to publishers in providing a greater understanding of how their books and which parts of their books are used, thus informing their future publishing strategy. The usage statistics for example, are an important in-put for deciding on pricing strategies, because information comparing the number of documents which users view onscreen vs. number of pages printed out, will help determine whether additional payment is needed for printing out documents.

Printing is a complex process to manage, because different publishers have different requirements on charging and on the number of pages a user can print per day. Printing therefore has to be controlled individually on a per publisher basis. Typically, users are restricted to printing ten pages per book per day. The University also levies a seven pence basic print charge for each page printed. Several publishers have asked for a royalty on printed pages, and this is to be added to the basic print rate. A printing control program has been developed which tracks all print requests and charges users for printing.

Licensing of Images

It has long been recognised that copyright in images presents rather more complexities than in the case of text. Images can have multiple ownerships by virtue of successive renditions of an object whether by graphic, photographic, digital or other means. Moral and paternity rights by which copyright owners may exert the right not to have their work altered tend to be more sensitive and vigorously protected than is the case with text. Any image even if embedded in text in a book is an independently copyrightable item. These issues, whilst not the primary concern of the first phase of ELISE were kept under review. Under ELISE II which will now move into an operational phase these issues will be specifically addressed and solutions developed from both a technical and a business point of view.

Through a fortunate coincidence De Montfort University was recently engaged by the Joint Information Systems Committee of the UK Higher Education Funding Councils to carry out a scoping study on the needs of UK H.E. institutions for digital images, and this study included consideration of copyright issues. This section of the study which was carried out by Professor Charles Oppenheim of Strathclyde University, shortly to join De Montfort University, has resulted in a draft model agreement specifically for images.

Conclusion

Over the last three to four years there has been considerable movement in the area of electronic licensing. This has been due to pioneering projects like ELINOR, now resulting in major actions like the UK E:lib programme and the European Commission's EBLIDA initiative.

We must remember that the copyright law is only there to protect owners' rights and adjudicate when parties disagree. The secret lies in not disagreeing, or infringing in the first place - which means developing licences which are acceptable to all concerned. Bilateral negotiations of licences is an arduous process which must be replaced by model agreements and national or bulk licensing schemes.

When we started ELINOR there was a sort of paralysis because libraries were afraid to do anything because of copyright considerations and publishers did not want to talk about licences for fear of losing their business. Considerable progress has been made since then and we are on the brink of establishing pilot national licences for text and in my view national licences for images will not be far behind.

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APPENDIX 1

AN AGREEMENT* made this .... day of .... 199..

between :-

DE MONTFORT UNIVERSITY
The Gateway
Leicester
LE1 9BH

(referred to as the 'University')

and

....
....
....
....
....
....

A The University wishes to set up an Electronic Library which shall meet the information needs of De Montfort University (hereinafter termed the University). The document database held on the University's information server will allow the electronic storage and retrieval of texts by staff and students at the University via Personal Computers connected to the campus network.

B The .... (hereinafter termed The Publisher), as publisher of the Works, has agreed to allow that use in connection with the University's Electronic Library system on the terms and conditions of this Agreement.

NOW BY THIS AGREEMENT it is agreed as follows:

1. The Publisher grants to the University the right to scan the edition(s) of the Work(s) published by the Publisher (as specified in Appendix I attached to this Agreement) and to hold the text(s) so scanned on an electronic storage device. The scanned text of the Work(s) is referred to in this Agreement as the "Electronic Text(s)".

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* This model is based on a model developed jointly by Edward Arnold Publishers and De Montfort University. It may be used by other libraries with due acknowledgement to De Montfort University and Edward Arnold.

2. The Electronic Text(s) will be made available only to authorised users on the University's campus network.

3. The University will arrange that the following notice is attached to the pages printed from each Electronic Text:

   (a) The title of the Work

   (b) The name of the Author(s)

   (c) Acknowledgement to the Publisher

   (d) Listing of pages printed

4. This Agreement does not grant the University or any user of the Electronic Text(s) any right to alter, adapt, or download the Electronic Text(s) on to disk or any other medium or into any other program (such as but not limited to a word processor) other than that necessary to render the Text(s) compatible with the University's Electronic Library system.

5. The University under this Agreement undertakes to provide to the Publisher the following information on a regular basis (Annually) while this Agreement is in force:

   (a) The number of occasions on which each Electronic Text has been accessed.

   (b) The total time for which the Electronic Text has been accessed.

   (c) The number of occasions on which pages have been printed from Electronic Text(s).

   (d) The total number of pages which have been printed from Electronic Text(s).

   (e) Charges to users of the Electronic Text(s) for the information to be given under (d) above.

   (f) Total print royalties received.

6. This Agreement will be in force for a period of ...... ***years*** from the date first appearing above or until the Work(s) is withdrawn from the University's electronic texts or until the University's scheme for electronic use of the Work(s) is discontinued (as to the last two of which the University will advise .... in writing) whichever occurs the earliest. At the end of the appropriate period this Agreement will terminate automatically but without affecting the University's obliga-

tion to send the Publisher any information then outstanding under Clause 5 above. Unless the University and the Publisher have agreed the basis for a new Agreement for the University's use of the Electronic Text before the termination of this Agreement the University undertakes to erase or otherwise destroy the Electronic Text(s) at the date of termination and to provide the Publisher with a written statement to that effect.

7. The University shall have the right to use each of the Electronic Text(s) for educational purposes only and shall not exploit such Texts or any part of them in this form commercially. The University will not assign, licence or otherwise transfer this Agreement or the rights granted under it without the Publisher's written consent.
8. This Agreement regarding the Electronic Text(s) may be changed only by written agreement signed by both parties to the Agreement.
9. The copyright of each Electronic Text shall continue to be held by the Publisher and original copyright notices and edition numbers of each of the Texts shall appear on each reproduction made of each Text on screen as acknowledgement of this copyright.
10. Royalties and payments
    In consideration of the rights granted to the University under this Agreement the University has agreed on the terms detailed in Appendix I attached to this Agreement for the right to scan and allow access to the Works held in electronic storage by the students and staff members on the distributed campuses of the University for the duration of .... specified in Clause 6.

For new titles an addendum to this agreement will be added once both parties have agreed on the terms.

AS WITNESS the hands of the parties the year and day first above written.

For and on behalf of DE MONTFORT UNIVERSITY	For and on behalf of .... (PUBLISHERS)
.... (Capacity):	.... (Capacity):

Appendix I

This appendix forms an integral part of the Agreement made on:

Date: ....

between: and:

De Montfort University ....
The Gateway ....
Leicester ....
LE1 9BH ....
United Kingdom ....

List of titles for which permission is granted to hold scanned text on an electronic storage device as laid down in Clause 1 of the Agreement referred to above.

Pricing model

Title	**Book price**	**Electronic fee**	**Royalty**

Journal Title	**Print subscription**	**Electronic licence**

Royalties and Payments

Total electronic licence fee for ..... years is £........
Annual electronic licence fee is £.........

The Publisher will supply an invoice for the University for this amount.

The print royalty is .... pence per page. Payment to be made by the University to the Publisher is on an annual basis.

For and on behalf of For and on behalf of
De Montfort University ....
....

(Capacity): (Capacity):

Acquisitions Policy in an Electronic World

Kathryn Arnold
De Montfort University, Milton Keynes, United Kingdom

Kathryn Arnold has worked in academic libraries for the last fourteen years. In August 1991 she joined De Montfort University as Information Centre Manager at its new Milton Keynes campus. As such, she has responsibility for library, open access computing and media facilities, and a close involvement with the ELINOR electronic library project, which has been running since March 1992

Abstract

Access to information by electronic means is increasing apace. The range of sources of information seems endless - commercially produced CD-ROMs, online databases, the Internet, local "electronic libraries". All of these are available, though often at a price. "Access" appears to be gaining ground over "holdings", at least as far as provision for research is concerned, yet this may be less appropriate in respect of undergraduate students are concerned. How feasible is the development of an electronic collection? Are there different factors to be taken into account when the "holdings" of the home institution are primarily in electronic form, or is the difference simply one of medium, whilst the underlying principles of acquisitions policy remain the same? This paper considers the issues influencing acquisitions policy in the electronic environment, drawing on experience gained during the ELINOR electronic library project at De Montfort University.

Introduction

Access *versus* holdings, electronic *versus* print - these are the choices which have been exercising the minds of information professionals for a number of years, perhaps most especially in academic libraries. In this paper, we consider whether a different approach is required for the acquisition of electronic information, or whether the principles which have underpinned our policies hitherto still hold good, and what new factors, if any, need to be taken into account.

A review of the literature reveals that almost all research, experimentation and documentation in this area relates to journals, rather than monographs, and is usually in the context of research rather than undergraduate study, although this is often implicit rather than overtly stated. Very few academic institutions are in a position to resource one of these areas to the exclusion of the other. Whilst necessarily touching on the former of these two aspects - journals and research - this paper concentrates on the latter - books and undergraduates. It is also not the intention in this paper to address the pros and cons of access *versus* holdings, but rather to consider the issues arising from a decision to hold material as far as possible in electronic form.

Both of these aspects will be considered in relation to the work of the ELINOR (Electronic Library INformation Online Retrieval) project conducted at De Montfort University over the past three years, and which is still ongoing. The ELINOR project will not be discussed in detail, as this has been well documented elsewhere[1 2 3], although it is necessary to give some brief background information in order to set the context. The paper will consider the following, drawing on the experiences of the ELINOR project where appropriate:

- Factors influencing acquisitions policy
- The ELINOR project - a brief overview
- Factors affecting electronic collection development in the current environment
- Acquisitions management and financial implications
- The future - a few thoughts.

Factors Influencing Acquisitions Policy

The traditional process of acquisition encompasses not just the selection and obtaining of materials, but also their management once obtained. In

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an electronic environment, the same is true, although we must now accept that we may be handling less tangible resources, and in this context it is becoming more appropriate to think in terms of information management rather than collection management or development. Nevertheless, we continue to apply the same basic criteria when deciding what information we should obtain on our users' behalf, given that we all operate with limited - and often decreasing - resources. These criteria include relevance, availability, real cost, and cost-effectiveness. The additional factor which we must take into account is the choice which often now presents itself, not only as to *whether* to acquire a particular item, but also as to the *medium* in which the item is acquired.

There is no prescriptive formula for library acquisitions, and such decisions will, of course, vary from institution to institution depending on their existing holdings and on their own priorities. A research institution will have different priorities from one primarily focused on teaching, and the means of achieving greatest cost-effectiveness in relation to undergraduate provision is likely to be very different from that for achieving cost-effectiveness in a research environment. Whatever the medium, the information most worth acquiring and retaining within the institution is that which will receive greatest use over a period of time; information of a more esoteric nature, required perhaps by only one or two researchers, is usually best accessed on a "just in time" and "pay as you go" basis. Remote electronic databases, linked to document delivery, enable institutions to provide information for their researchers more effectively, efficiently and economically. Unfortunately, the same is not yet true of provision for undergraduate students, and most academic libraries, in the UK at least, are faced year on year with the prospect of providing texts for an ever greater number of increasingly indigent students, from a budget which at best remains static.

The ELINOR Project - A Brief Overview

The aim of the ELINOR project was initially stated to be "to develop a fully electronic library environment within five years", such that "the information required by students and staff will be delivered primarily in electronic form or by electronic communication systems"[1]. The motivation for the project was, in part, an attempt to address the problem already outlined above: that of providing library support to an increasing number of undergraduates with a budget which was not keeping pace with this growth.

In the case of De Montfort, the issue was brought even more sharply into focus by the distributed nature of the University. At the time the project began, it had three campuses in two cities; there are now nine campuses in four cities, with almost 150 kilometres between the most northerly and the most southerly. Whilst each campus emphasises particular disciplines to a certain extent, there is inevitably an degree of overlap in terms of resource requirements. The institution sees the networking of resources as a major factor in avoiding unnecessary duplication whilst ensuring that these requirements are met.

The pilot target group for the project comprised first year undergraduate students on a Business Information Systems programme, and the target material was anything which appeared on their reading list, as supplied by academic staff - mainly textbooks, supplemented by a small number of journal titles, together with course notes and examination papers. We were immediately confronted with a major problem: neither the textbooks, which formed by far the largest proportion of the recommended material, nor the particular journal titles required, were available in electronic form. This had an immediate impact on the "acquisitions policy" for our electronic library. Access vs. holdings was not an issue; nothing could be accessed remotely. Everything which we needed to make available to our students had to be held locally, obtained first in hard copy, then scanned into a database using document image processing technology before being delivered to users via desktop workstations.

A major objective of the pilot phase of the research project was to engage the publishers in a dialogue and to stimulate the market in electronic publishing of, primarily, books. Our acquisitions policy during this period was therefore somewhat less structured than would typically be the case in a "traditional" environment. Our approach was pragmatic: if an item appeared on the reading list and permission was granted, it was included in the database, regardless at this stage of likely level of use. The terms of acquiring the item were to a large extent dictated by the publishers. The cost-effectiveness of this approach would be studied during the pilot.

Factors Affecting Electronic Collection Development in the Current Environment

What is acceptable for a research project may not necessarily be appropriate when scaled up and implemented in the real world. Assuming that the

ELINOR pilot proved the feasibility of the electronic library, it was always intended that it would be implemented in an operational context. The pilot achieved its aim of opening a dialogue with the publishers and proving that an electronic library "worked" in a technical sense; however, once operational, cost-effectiveness obviously becomes a much more significant factor. The other major factor at present is availability.

a) Cost-effectiveness

At the Milton Keynes campus of De Montfort, the strategic decision to acquire materials in electronic form wherever possible had already been taken. For example, when considering bibliographic tools, we were not faced with making the decision to replace existing print subscriptions with electronic; the electronic version was selected from the outset. Our reasoning was straightforward: for the same cost, or little more, information sources could be made simultaneously available to a greater number of users in a more effective way.

The decision to develop a library of electronic textbooks was based on the same premise. It was unlikely to be cheaper in real terms, but would enable resources to reach a greater number of students in a more flexible way. The key phrase here is "greater number of students". It soon became evident that in order for the project to become cost-effective when scaled up into the operational context, high use material had to be the focus of our approach to the publishers.

The value of the "unweighted" reading list, supplied by academic staff, as a reliable indicator of what undergraduates will read in practice has long been viewed with some scepticism by librarians, who have made decisions accordingly about numbers of copies to purchase, etc. User studies during the pilot confirmed this scepticism to be if anything even more justified within the current electronic context. Predictably, those materials which were accessed most often were those to which the students had most difficulty in gaining access in printed form. Texts accorded lower priority by the students - and these were often the most academic and most expensive - were rarely, if ever, consulted, since the printed version of the same text, being in limited demand, was readily available on the library shelves.

In the light of these results, our policy for electronic acquisitions has been modified and we are now targeting material which we would typically include in our short loan collection, or items for which we register a high number of reservations. More recently, we have begun to take into account the extent to which items will be used across different campuses of the university.

A major problem in acquiring textbook material at present is that each publisher has to be negotiated with on an individual basis, which is extremely time-consuming and, on an operational scale, impractical. There is no middleman, equivalent of the bookseller, through whom all requests or orders can be channelled. In addition, because we are in an era of experimentation, there is as yet no single agreed pricing mechanism; perhaps even more importantly, there is no single agency which can negotiate such agreements with the publishers on behalf of libraries.

The ELINOR project is at present operating with no less than eight different pricing agreements[2], some of which will clearly not be viable beyond the pilot phase from the point of view either of the publisher or of the library (**Table 1**). The disparity in relative costs of the various models for a high-demand textbook costing £20, serving a group of fifty students, and of which five printed copies are already held in the various campus libraries, is illustrated below. It should be noted that all the agreements run for fixed periods ranging from one to three years, at which time a further payment will have to be negotiated assuming the text is still relevant to our requirements.

Models 1 and 2 are clearly not viable to the publisher in the long term; we are grateful to those prepared to co-operate with us on this basis during the pilot. Equally, model 3 will not be acceptable to libraries in a scaled-up operational environment, whilst models 6 and 8 seem to be examples of publishers both having their cake and eating it, in that they require the same returns as for printed sales plus an additional charge, without any obvious advantage to the purchasing institution. No library can afford the luxury of acquiring both print and electronic versions in equal measure, particularly on the basis of recurrent charges or additional royalty payments. In addition, model 8 raises the issue of how to calculate the fee for an item not previously purchased. In the case of 5 and 6, a further consideration is the unknown eventual cost; these models could be advantageous if the level of printing is low, but the question then arises of who pays the print royalty - the library or the end user?

Models 4 and 7 thus seem to be those most worthy of further development, although both require further modification; for libraries, model 4 will need

Model	Terms	Cost to library
1 No charge	No cost during pilot phase	£0
2 Contract fee	Nominal £1 per title during pilot	£1
3 Fee per workstation	Paperback price x access points (3)	£60
4 Software licence	1/3 paperback price x *possible* concurrent users (10)	£66.66
5 Page charges	Royalty per page printed	??
6 4 + 5	Access fee concurrent users *plus* print royalties	£66.66 + ??
7 Potential readership fee	No. of potential readers x 10% + book price	£25
8 Printed copy fee	Flat fee based on past purchases of printed copies	£100

Table 1: Comparative Costs of Agreements

a reduction from the current 1/3 price of book as the number of possible concurrent users increases, while for publishers, in respect of model 7, the percentage of potential readers in the formula may need to be increased, particularly in the case of core texts. For neither party is it practical to provide a complete substitute to the student purchase of textbooks.

b) Availability

Journals

Based on their experiences from participation in such activities as current awareness services and individual article supply, a number of major journal publishers are now experimenting with schemes which will effectively give institutions the right to "acquire" full text journals in electronic form, which from the perspective of undergraduate provision is much more appropriate than the online access, since individual equipment is not required, and cost control is possible. For example, Elsevier are making the electronic versions of their journals available for around 125% of the cost of print subscriptions (or 135% for both). Academic Press, Blackwell and the Institute of Physics have combined to put forward a proposal to the Higher Education Funding Council regarding a national site licence granting all HE institutions access to all their journals in electronic form.

On the surface, this sounds very attractive; however, in reality the actual benefits may vary considerably between institutions depending on how the package is implemented. The precise terms still have to be determined; it is not yet clear how it will be funded - will the institutional budgets be top-sliced in order to pay for it? Will all institutions have automatic access to all titles, or will it be possible to buy into only those titles required? If not, smaller, monotechnic institutions may find that they are effectively paying for information they do not need; larger, older institutions may be paying again for journals to which they already subscribe and as a result of any top slicing will find that they have less disposable budget to spend on journal titles of their choice. In either case, the element of selectivity is removed from the acquisitions process.

Books

Progress towards general availability of books in electronic form is much slower and more piece-meal. Many reference works are now available on CD-ROM, and a number of electronic, multimedia books are available for the younger age group or for specialist areas such as medicine. The development of texts in electronic form for use across the range of disciplines in higher education, however, is still very much in its infancy and is likely to remain slow until a mass market is apparent to publishers, or until the academics who author these texts adopt a new approach and force this market by structuring their work specifically for electronic publication.

Some encouraging signs are appearing; for example, the ELINOR team has been working with one of the project's publisher partners to develop a true electronic text book. A drive towards greater standardisation of format may encourage publishers to retain their typesetting tapes and make these more available to end users. For some time to come, however, it seems likely that electronic collections of textbooks will have to be developed for the most part on the basis of digitising the printed text.

Acquisitions Management and Financial Implications

A number of practical management issues are emerging within our own university library service from the move towards electronic acquisition of texts at an operational level. To many of these we have not yet found an answer. The mechanics of the acquisitions process have had to be addressed. How do we incorporate the acquisition of electronic material into the mainstream when there are no tangible items? How are our stockholding statistics affected? How do we incorporate items into the catalogue, if indeed we do?

Some of the financial issues arise from the university's budgetary structure, in that each of the four locations has its own library budget, with separate budget managers, and subject librarians making decisions about appropriate acquisitions for that location. Although we operate as a team, offering an information service across the whole university, each location inevitably has its own priorities. During the pilot, licences were negotiated on the basis of access at Milton Keynes only; now they are being negotiated on a university-wide basis - and charged for accordingly. How should these charges be met? Does the campus with the largest number of students pay proportionately more? Should the cost be shared equally? Should the smallest campus, which may not have purchased the same item at all in hard copy, be expected to contribute, or should this be seen merely as part of the added value of networked information? Should we top slice all four budgets to create a central "pot" for such cross-institutional purchases? If so, how do we charge this back to the departmental budgets - we are, after all, simply buying textbooks in a different medium.

The issue of cultural change by both library staff and academics is fundamental. Currently, electronic texts are widely perceived as a welcome added extra, and as something which should be purchased as well as, not instead of, printed books - and certainly not to be paid for from their normal library budget. A change in this attitude must be effected if the electronic library is to succeed, since, as stated previously, no library is in a position to purchase both media, particularly if publishers are developing charging mechanisms on the basis of declining sales of printed books.

The Future - A Few Thoughts

For the immediate future, then, it seems that institutions wishing to make textbook information available to their undergraduates will still have to "acquire" that information and mount it on a local database. Decisions on acquisitions are thus likely to be made according to the same criteria as for printed texts initially. However, the use of electronic texts will lead to improved knowledge not only about which books are accessed (our issue statistics give us a fair indication of this at present in respect of printed books), but about how they are used - which pages, chapters, by which groups of student, etc., which should make our acquisitions decisions better informed in future.

We believe that this same information will also be useful to publishers and may lead them to consider their own policies. As academics - the authors of these texts - work in an increasingly electronic and multimedia environment, and are influenced by developments in journal publishing, we can perhaps look forward to a time when true electronic texts are available from a database or databases over the Internet, either via an "electronic bookseller" or direct from the publishers. We will be able to select which books we require - or even which chapters of those books - in the same way we are now able to select individual journal articles, and download them into our own electronic library for undergraduate use.

Many of the issues outlined above arise purely from the transitional stage at which we find ourselves at present. As standard agreements are reached on pricing, copyright and format, the underlying principles of acquisition policy will remain: relevance, availability and cost-effectiveness. The great difference is that our decisions will be much better informed.

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Preserving What We Really Want to Access, the Message, Not the Medium : Challenges and Opportunities in the Digital Age

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Charles Hildreth, whose earlier careers have included big bang music, philosophy teaching, Senior Research Scientist at OCLC (1980-85), Chief Consulting Scientist for READ Ltd., is now on the faculty of the School of Library and Information Studies at the University of Oklahoma. He received his Doctorate in Information Science in 1993 from the City University, London (UK). He was active for many years in the American Library Association (ALA) and the American Society for Information Science (ASIS). Dr. Hildreth served on different boards of organizations in librarianship, currently on the Board of Directors of the Western Library Network (WLN). He is a member of the editorial boards of Library Hi Tech and the Public Access Computer Systems Review.

Abstract

In this new age of digital imaging and optical recording technologies, widescale access to documents is no longer the enemy of preservationists. Access and preservation strategies are no longer incompatible. Digital imaging technology is the first preservation technology that has the potential to increase and expand access to recorded knowledge rather than limit and restrict that access. Some visionaries are now proclaiming that in the digital world "preservation is access, and access is preservation." Digital image formats are now seen not only as feasible alternatives to print and microfilm formats for traditional preservation purposes, but also as the technology bearing unlimited access and distribution potential.

We must keep in mind the distinction between *physical* access to documents and *intellectual* access to published works and their contents. It is ironic that while digital imaging technologies have the potential to increase physical access to documents, these same technologies have no inherent capabilities to improve intellectual access to the works represented in these documents, and may, perhaps, actually diminish such access.

Converting textual documents and other formats to digital formats may expand physical access to these materials, especially in a networked world, but such conversion presents new challenges for providing and enhancing intellectual access to these works. For example, what are the requirements for browsing and exploration in the digital library of the future? Is the open bookshelf browsing model of seeking and exploration in a classified physical collection valid in the universal virtual library, or are new models of intellectual access and exploration needed? This paper will examine these issues and challenges.

1. Introduction

My first acquaintance with Patricia Battin came through the publication of her paper, "The electronic library - a vision for the future," in the Summer 1984 EDUCOM Bulletin. A copy of this paper was delivered that year to my research office at OCLC by one of OCLC's stellar librarians. Knowing of my research on online catalogs, she surmised correctly that I might also have an interest in what Ms. Battin had to say.

I would like to share with you a few passages from Ms. Battin's 1984 paper:

> *What the personal computer does mean is the end of the printed page as the sole means of scholarly communication and information storage and retrieval. There will be, in the future, a mix of formats as well as a mix of hardware. If the new, expanded information systems are to be successful, we will need to create a new information infrastructure to provide the electronic scholar with the same kind of universal gateway access to recorded knowledge as the traditional library provided for printed materials.*
>
> *The challenge for universities is not simply to explore the role of computers on campus, but also to integrate information technology into the existing information system in a way that preserves the*

> *linkages to the existing knowledge base, encourages and stimulates the productive use of new technologies, and provides coordinated gateway access to the universe of knowledge in a manner convenient and invisible to the end user. That is the dream.*[1]

That dream, so eloquently articulated by Ms. Battin - *coordinated gateway access to the universe of knowledge in a manner convenient and invisible to the end user* - has become the central user requirement in the rapidly expanding environment of electronic information and electronically-based research and scholarship.

2. Research for this Paper

After graciously accepting my proposal for a presentation at this year's Essen Symposium, Dr. Helal encouraged me to focus, in part, on digital preservation issues and challenges. (Many of you know that I have continued my interest and research in library applications of electronic storage and retrieval technologies, including the online public access catalog.)

Let me say at the outset that I am only a lukewarm bibliophile. Although my shelves are lined mostly with books, I regard very few books as singular works of art, that is, artifacts deserving special care and handling. I speak of course of the print "containers" we call books, not the actual works of authors. I will have more to say on this later.

In my eighteen years in librarianship, I have had very little experience with archivists, special collection librarians, and preservationists. My memories are of isolated collections in controlled-access, climate-controlled rooms. I had much to learn as I began my research for this presentation.

Although my faculty office is located in a major university research library, I began my research at my computer workstation by first browsing some Internet-based listserv archives. After identifying some recent discussions of digital preservation, including some works in progress in draft form, I fetched and downloaded these electronic, digital "documents". The citations in these documents led me to other key articles, images of which were faxed to me. Furthermore, my Internet research helped me identify key individuals, organizations, and projects active in the creation, maintenance, and preservation of digital libraries and collections. I discovered that at the very epicenter of this activity, in North America, stood Patricia Battin and the Commission on Preservation and Access, an organization she helped establish in 1986, and for which she served as its first President.

It only took me a few minutes to discover that the document archives and current reports of the Commission are available on the Internet. The World Wide Web Home Page of the Commission on Preservation and Access (*http://palimpsest.stanford.edu/cpa/*) provides a convenient gateway to a rich collection of Commission newsletters, annual reports, and commissioned studies on preservation issues, technologies, and challenges.

To sum up, approximately eighty percent of my research for this presentation was conducted electronically. To review traditional definitions of book conservation, preservation, and the cataloger's distinction between a "work" and a "book," I went to the print collection of our university library's reference room to find the appropriate glossaries and textbooks. This was the lesser part of my initial research.

3. What I Discovered in My Research

It is a fascinating, eye-opening experience to go online on the Net and electronically trace the activities of organizations like the Commission on Preservation and Access, the Digital Archive Task Force, and the Digital Library Federation. One can even gain important historical insights in this way. As more and more information is being generated, disseminated, and used in digital form, the activities of the preservationists are increasing in frequency and visibility. I found this surprising at first.

In their annual reports and other official documents, the Commission on Preservation and Access publishes this standard statement:

> *The Commission on Preservation and Access was established in 1986 to foster and support collaboration among libraries and allied organizations in order to ensure the preservation of the published and documentary record in all formats and to provide enhanced access to scholarly information.*

My naive suspicion that these preservationists were primarily interested in conserving old books and promoting acid-free paper for new books was quickly laid to rest. If this were ever the case, it soon became clear to me that the focus and goals of preservationists had changed. However, we must recognize that the interest in and acceptance of the importance of *digital* preservation is a recent development in the 1990s.

A careful reading of the Commission's first newsletter, dated June 1988, reveals that microfilming is the only preservation technology mentioned. The "national brittle books" program is mentioned, as is the Commission's goal to encourage the use of acid-free paper for print publications. In the Commission's first Annual Report, published in June 1988, it is clear that microfilming is the preferred preservation technology:

> *The Commission's fundamental objectives are the following:*
>
> - *the preservation, on microfilm and other archival media, of the contents of deteriorating printed materials;*
> - *the conservation, where appropriate, of the book as an artifact;*
> - *the creation of a cost-effective system to provide unrestricted access to copies of preserved materials in a choice of formats;*
> - *the use of alkaline paper for publications of enduring value; and*
> - *the institutionalization of preservation as a vital component of library and archival operations on a continuing basis.*

It is of historical importance to note that this annual report announces the establishment of a "Technology Assessment Advisory Committee" to investigate the "emerging capabilities of digitizing technologies" for storage and retrieval of preserved items.

Scanning "fast forward" to 1992, I note that the Commission published a study by Donald Waters of Yale University entitled, "Electronic Technologies and Preservation." The Commission's aim in publishing the paper was "to further stimulate discussion about whether and how consortial efforts can generate in the nation's research libraries useful, productive and economical applications for preservation purposes of important new electronic technologies, including particularly digital imaging technology."

In his introduction, Waters states that "I want to explore the place of digital information in the access-oriented mission of the library, to review some of the preservation concerns for information in digital form, and to focus specifically on information in digital image form."

In October 1992, the Commission published the report of its Technology Assessment Advisory Committee, prepared by Michael Lesk. Recall that "the group was charged in 1989 with advising the Commission on applications of electronics for the preservation of and access to deteriorating paper-based materials. This report, one of a series, goes beyond the preservation of print materials. As such, it is a technologist's summary of how digital technology applies to preservation problems." (Rowland C.W. Brown, Chair, Technology Assessment Advisory Committee)[4]

Recognizing the problems associated with digital formats and media, the Committee strongly recommends *digital* preservation as the primary route to be followed in future programs and projects.

In the Commission's Annual Report of June 1993, under the heading of "Special Report: From Preservation to Access - a Paradigm for the Future", Ms. Battin writes: "technology has created a new definition of our concept of preservation." She continues:

> *Perhaps the most formidable characteristic of digital technology is its ability to destroy the comfortable traditional borders and boundaries outlining and shaping our institutions and professional pursuits. The history of preservation and the manner in which technology continues to change the way we think about both preservation of and access to information provides an illuminating example of the power of technology to change the culture, the organizations and the basic principles of our society. As we have explored the uses of digital technology to preserve the deteriorating printed documents of the past, the paradigm of the virtual library has emerged: In the digital world,* ***preservation is access, and access is preservation.*** *The boundaries of the analog world have dissolved. What, then, is the future of preservation? ... With digital technology, we have entered into a ceaseless spiral of change which represents, not so much an evolution from, but a formidable disjunction with the analog world, and as preservationists, we must straddle both worlds.*[5]

Although millions of dollars are still being budgeted for microform preservation projects, I think we can say the brief era of microform preservation is over. Just as the OPAC accelerated the obsolescence of the card catalog (and, incidentally, the short-lived COM-catalog), so digital preservation technologies have led to the obsolescence of microfilming as a desirable preservation technology.

Looking back over the past three and one-half decades, we can identify three overlapping periods of preservation activities. Prior to the 1960s, there seems to be little concentrated or national preservation efforts. First came the "book preservationists" motivated by the growing number of "brittle books" and "Slow Fires" in our library bookstacks. We owe to them thoughtful conservation projects and the promotion of acid-free paper standards for the publishing industry. Then came the microfilm preservationists who directed national and international attention to preservation needs, and succeeded in acquiring large amounts of funding for the reformatting of millions of titles of deteriorating books and periodicals held by our libraries. Now, in the 1990s, we have entered the age of digital preservation and the growing generation and storage of digital information in a networked environment. Indeed, "preservation is access, and access is preservation."

Preservationists strike me as truly Janus-like guardians of our intellectual past and unfolding information future. Janus was the Roman God who had two faces, front and back: one old and the other young. In his temple, whose doors he guarded, the doors were closed only when Rome was at peace, and was not, presumably, out conquering the globe and its peoples. The Romans considered Janus as the God of "good beginnings" that would then lead to good endings.

4. Why Digital Preservation is a Good Thing

Let me state the case in a rather straightforward way. Access to and use of digitally preserved works can be expanded infinitely with no threat to the quality and existence of the original works. This was not the case in the era of conventional (pre-digital) conservation and preservation of manuscripts and printed books, where tradeoffs often had to be made between preserving the content contained on or within physical artifacts, and providing access to that content. As Ms. Battin has pointed out, "In the era of manuscripts and printed books, access to knowledge depended upon the health of the artifact. And the longer the life cycle of the artifact, the lower the access to the knowledge it contained."[5]

In conventional print preservation efforts, the central objective is the preservation of an artifact. There is no intrinsic relationship between these efforts and the expansion of access to the intellectual *work* contained in the artifact. Additional, extrinsic considerations must be brought to bear if preserved information artifacts are to be used to any degree. In digital preservation, the very product of the effort affords expanded, widescale access to the work. There is an intrinsic relationship between the technology of digital preservation and what Patrick Wilson calls the new "technologies of availability."[6] Wilson has in mind the global access to ever-larger amounts of electronic, networked, digital information we are already taking for granted.

5. The Tyranny of Nearby and Half-Way Technologies

Let me explain what I mean by "nearby" and "half-way" technologies. Half-way technologies are typically early, partial solutions to critical problems. These solutions may be better than no solution at all, but they are solutions that produce undesirable side-effects or require costly and painful tradeoffs that we would rather not have to make, if only a better solution could be found. Often we do not realize they are half-way technologies until something superior and more accommodating comes along. Examples of half-way technologies include the "iron-lung" (used to treat polio victims until the superior technology of the polio vaccine came along), all forms of radical surgery, eyeglasses, manual and electric typewriters, hot-metal typesetting, and the card catalog.

"Nearby" technologies are those technologies that have well-designed practical value, but are of little or no utility unless they are "nearby" and, in some cases, "in hand." Nearby technologies include bicycles, eyeglasses, condoms, card catalogs, and books. I leave it to your imagination to add nearby technologies to this brief list.

Having to have things nearby to use them or to benefit from them is not always an advantage. The printed book is a nearby information technology. Having it nearby is not only convenient for informing purposes, but having a book in hand can be comforting as well. However, a printed book can only be in one place at any one time. A printed book that is known and desired, but not at hand, can be a real source of frustration. To illustrate my point, in the traditional library setting, what more pleasant words than these can be heard by a patron who wants a specific book: "Yes, we have the book and you can borrow it now."

As a researcher, teacher, and avid reader of escapist fiction, I am fond of the printed book or journal, especially when they are conveniently at hand or nearby. Nevertheless, and putting convenience aside, my interest is not in the book itself, but in the *work* or content that is contained within and delivered by the book or other physical medium.

In his article, "Publishing Over the Next Decade", Rawlins waxes enthusiastically about the "electronic book." This is another of my favorite oxymorons. I am about as fond of this term as I am "horseless carriage"!

But Rawlins does force us to consider some critical shortcomings of the printed book, a half-way, nearby technology.

> *The advantages of printed over electronic books as a medium of information storage and exchange are that they are robust, they need zero power, several can be open at once, they have been around for 550 years, all literate people know how to use them, and they are readable in strong sunlight.*
>
> *Their disadvantages are that illiterate people cannot use them, it is easier to print an electronic book than it is to digitize a printed book, and it is hard to collate nonsequential but related parts of one book, or many books by several subjects. Further, they do not talk, adapt to their readers, or have animated illustrations or music. They do not let readers zoom or pan illustrations, or increase or decrease their font size, nor do they recognize voice commands or visual cues. Finally, they are not cheap, long lasting, easily copied, quickly acquired, easily searched, or portable in bulk.... About all that can be said of paper books is that they are lighter than clay tablets, less awkward than papyrus rolls, and cheaper than parchment codices.*[7]

Negroponte reminds us in his new work, "Being Digital," that the cost of acquiring a book "includes shipping and inventory. In the case of textbooks, 45 percent of the cost is inventory, shipping and returns." And he adds, "Worse, a book can go out of print. Digital books never go out of print. They are always there."[8] And, I hasten to add, in the networked information environment, "there" can be anywhere.

6. The Medium is Not the Message: Access to Works, Not Containers

Responding to the cult of McLuhan ("the medium is the message"), Negroponte argues forcefully and frequently that in the digital age, the message, once encoded into bit streams, is truly independent of any particular storage and transfer medium. The digitized message content has, in a very real sense, been "liberated" from its container book, or any other physical format, and has been liberated from the constraints to access and use inherent in the physical formats.

Librarians, of course, have been aware of this "content in the container" dilemma for some time, as expressed in their careful distinction between "physical access" to books and "intellectual access" to works. This distinction between works and books has been central to cataloging theory and practice in the 20th century.

In describing the "bibliographic universe and its parts," the Librarian's Thesaurus, following Lubetzky, has this to say:

> *Works consist of the intellectual content of units, and thus have no physical existence until embodied in an actual physical book. ...the material record of a work. ...The existence and extent of a work is defined by a creator or author; the book or books that contain a work are usually defined by the producer or publisher.*[9]

Harrod's Librarians' Glossary, 7th edition, defines a "work" as:

> *Any expression of thought in language, signs or symbols, or other media for record and communication [i.e., a work before printing or other publication]. After publication it becomes a 'published work'.*[10]

Patrick Wilson reminds us that,

> *In three working papers prepared for the 1961 International Conference on Cataloging Principles, Lubetzky, Verona, and Leonard Jolley all agree that the object of interest, in the normal search of a catalog, is not a particular book or other publication, but rather the work represented by the book. In Verona's words, 'the object of the reader's essential interest is not the publication but the work represented by it. There is no denying the fundamental truth of this statement, which appears to assign greater importance to works than to books in relation to the catalog.' Jolley agreed that 'it is quite obvious that the reader is normally interested primarily in a work rather than in a specific publication.'*

Wilson urges us to respect the "predominance of the work," and to end once and for all the "dominance of the publishers' package" in our obsolete cataloging objectives and practice. He recommends that Cutter's well-known second "object" of the catalog be placed above the even better known first objective in our cataloging-for-access priorities.[11]

In the print on paper age, not only was the distinction between physical access and intellectual access an unavoidable conceptual distinction, in practice, two fundamentally different sets of operations were required to achieve full access to works. In the digital environment, we have the opportunity to provide a more unified, integrated approach to knowledge acquisition and transfer.

Works are works, and bits are bits. But when works are bits (rather than physical atoms) and bits are works, in a very real sense, the age of works *imprisoned* in physical bondage - that is, half-way, nearby technologies - may be nearing an end. The material enslavement of intellectual works - our cultural record - has resulted in nearly unsolvable problems of preservation, access, and use. Our best efforts to provide full bibliographic and physical access, honorable as they are, have largely been half-measures.

Recording or transforming works into bits makes possible unprecedented widescale access and use, without any intrinsic threat to the existence and quality of the original works. I think this is what Ms. Battin means by "preservation is access, and access is preservation."

7. The Library of the Future - Are We Asking the Right Questions?

In closing, let me share with you two concerns. The first has to do with how we talk about libraries in this early stage of the digital age, and the second concern is about the new access challenges confronting us in an environment of global networked access to vast amounts of digital information.

About the library of the future we ask: Will it be an electronic library? Will it be a library without walls? Will it be a digital library? Will it be a virtual library? Will it be "just-in-case" collection-oriented or "just-in-time" access-oriented? The onslaught of new computer and telecommunications technologies are, no doubt, forcing us to address these issues. However, our rhetoric tends to out-distance our knowledge and collective wisdom. Furthermore, I wonder if we are asking the right questions. Rather, should we be asking questions like these: How will research and scholarship be conducted in the future? What transformations are currently taking place in this arena? What kinds of service and assistance will today's library users need in the emerging electronic digital age; and what will they need when it is fully in place?

Today's research libraries, even as they struggle heroically to integrate electronic resources into their mix of services, are "places in spaces" - both physical spaces and institutional places. Study after study has shown that faculty and researchers, given a more convenient option, would rather not come to our libraries to access and obtain copies of works. Researchers and scholars want convenient, effective access to works of potential interest to them, and they want selected sources on demand. More and more these identification, access, and selection activities are being performed at the scholars' personal workstations, yet we still talk bravely of places and collections, albeit, digital ones. Both the early and later stages of research and scholarly activity intimately involve the pre-monograph, periodical literature. Thus, the trend to electronic publishing of the periodical literature bears watching. In the 1980s we spoke of dozens of electronic journals; in the 1990s we speak of hundreds of e-journals and related forms of electronic communication. In the next decade, will it be thousands of e-journals we have networked access to, or most all of them?

Nicholas Negroponte encourages us to reflect carefully about the ramifications of the new technologies of availability, and the concept of "place without space."

> *In the same ways that hypertext removes the limitations of the printed page, the post-information age will remove the limitations of geography. Digital living will include less and less dependence upon being in a specific place at a specific time.*[8]

Applying these insights to libraries and their collections, Patrick Wilson adds:

> *What these technological changes do to the traditional idea of a library collection is clear enough. When storage medium and display medium were the same, the only way to get the information in a store was to have a copy of the store itself: availability of information required availability of a physical object that was simultaneously the carrier and the display of information. No longer: availability of a store of information at a place does not require the presence of an actual display but only a virtual display, that is, the possibility of producing a visual display, transitory or lasting. Availability at a place does not require the physical presence of a copy, but only the possibility of producing a copy, and the collection of actual and virtual copies now constitutes the available stock of information.*[9]

Furthermore, Wilson continues,

> *A remote source available to one is potentially available to all; and as the technology of information transmission marches on, in-*

> *creasingly the information held in any form by one library will be available to others in some form without physical transportation of physical objects.*[11]

Several years after Wilson's remarks, as we enjoy the presence and promise of the global information environment supported largely by the Internet, no one can doubt the accuracy of his projections.

My second concern has to do with "intellectual access" to the growing amount of electronic resources in the networked information environment. Intellectual access requires access to the content of works, and, at a minimum, enough content access to sufficiently inform the researcher's efforts to identify and evaluate works of potential relevance. In a networked information environment, this access cannot be satisfied by conventional indexing and retrieval methods represented in our current online library catalogs and other database search systems. As Rao and her colleagues have argued, "Effective information access involves rich interactions between users and information residing in diverse locations."[12] Intellectual content access requires us to make a paradigm shift from optimizing user-*system* interaction to enriching user-*information* interaction. The authors put forward the concept of an "information workspace" to replace the notion of a scholar's workstation. Mischo and Cole provide one of the best functional definitions of a scholar's workstation in a transition stage on the way to becoming an "information workspace":

> *From a single workstation, a user will be able to 1) perform a literature search using the major periodical index databases; 2) identify, retrieve and read the full text of journal articles, book chapters, etc.; 3) send results to electronic mailboxes and personal databases as desired; 4) use scholarly software residing on the workstation or provide a gateway to a remote computing facility (such as a supercomputer) for data analysis or preparation; and 5) capture and display the results of the work using the multimedia capabilities of the workstation to prepare presentation materials for the classroom or publication.*[13]

It is not too soon to shift our emphasis from convenient, timely enhanced actual ("physical"?) access to information objects over to efforts to enhance the modes and methods of intellectual access to networked information sources. What I have in mind is better exploratory browse, search and retrieval mechanisms and user interfaces that will assist network information seekers in their tasks of identifying, evaluating, and retrieving works and information potentially relevant to a topic of interest, or useful in solving a problem under consideration.

There are some very good finding tools on the Internet and the World Wide Web, for those instances when you have a pretty good idea what you want before you start looking for it. Effective exploration and browsing tools that take the searcher deep into the content of works on the network are still lacking.

As we stand on the threshold of an exciting era of expanded information access and delivery, there is another danger equal, perhaps, to the uncritical adoption of new technologies. The danger I speak of is the danger of uncritical devotion to outmoded models (forms, if you like) and long-standing ways of doing things. (I am tempted to coin the phrase, "bibliographic nostalgia," but I shall restrain myself.) Furthermore, the gloss of new technologies may disguise the fact that underneath, things remain pretty much the same as they always were.

Let me bring to mind imagery from a not-so-long-ago era in library history. It is a personal recollection of a "hard" reality, far distant, it would seem, from those virtual realms we hear so much about these days.

Thirty years ago, while a young undergraduate student at the Ohio State University, when I went to the main library on campus to look up materials, I accessed the massive public card catalog to locate needed books or bound periodicals. If successful at the card catalog, I then went to a designated "workstation" which supplied small pencils and small slips of paper. For each book I desired I wrote down on one of these slips its author, title, and call number. I then took these slips to the circulation (check-out) counter where a clerk confirmed that they contained sufficient data and sent them via pneumatic tubes to "stack runners." You see, the stacks with their organized shelves of books were closed to ordinary folk like undergraduate students (unless one was employed by the library as a stack runner). Bookshelf browsing, as a means of discovering works of interest, was not permitted. In this closed-stack retrieval system, you had to know precisely what you wanted and identify it in the card catalog before it could be retrieved by a stack runner from the bowels of the library warehouse.

Another way of expressing my second concern is this: By providing network access to our conventional online catalogs using advanced access tools like Telnet, Gophers, Z39.50 protocols, WAIS, World Wide Web, etc. - that is, opening the doors to a vast number of online "libraries without walls" - are we not at the same time "closing the stacks" and eliminating the opportunity for a variety of kinds of meaningful browsing, browsing that often leads to the discovery of previously unknown items of interest? I consider personal interaction with an organized collection of published materials to be a rewarding activity, and I think providing this opportunity should be a service priority of most libraries. As we shift our priorities from building and maintaining physical collections to the provision of electronic access to document collections, are we not in danger of eliminating a qualitative experience and closing the stacks once again? Perhaps today's network access technologies like WAIS and Z39.50 are the digital versions of human stack runners and book retrievers.

8. Conclusion

Thousands of library and other document collections can now be accessed with relative ease via the Internet, either by Telneting to a library's online catalog network address, selecting one from a Gopher directory menu or a Web home page. Almost all of these online catalogs and retrieval systems can be characterized as query-oriented retrieval systems. They have very limited relevance feedback, query refinement, and browsing capabilities. As such, they place intrinsic limits on the potential of new network-based access and search technologies, like the Z39.50 protocol, to provide more effective and more appropriate search environments for many kinds of search needs and behavior.

Although some uniformity will be introduced in the searching of networked online catalogs when Z39.50 and the ISO Search and Retrieval protocols are widely available for use (conforming software must be developed and installed on hosts and/or network servers), limited search and browse functionality is supported by the standard approach, and little assistance to the user having search problems during a session will be provided by the new protocol-based search interaction. For example, this approach will not inform the user why a search resulted in no matches. The search can be repeated with new attributes and/or values, but it will be transmitted and processed in the same pre-defined and rigid manner. The assistance of a friendly local user interface will be excluded from this process.

The WAIS (Wide Area Information Servers), a distributed database retrieval system also based on the client-server model, provides a rudimentary kind of weighted-term document retrieval from indexed databases on the Internet. WAIS displays retrieved documents in ranked order, with those documents most likely to be relevant to the query listed first, and WAIS offers some opportunity for relevance feedback on retrieved documents so that the search can be refined and extended. WAIS is an application of the probabilistic theory of information retrieval promoted for many years by researchers as a better alternative to conventional Boolean retrieval systems. However, WAIS is still a query-oriented approach which provides only limited, rather linear browsing capabilities.

The first network access technology with promise for inveterate browsers is the World Wide Web (WWW, or W3). The Web supports hypertext retrieval and browsing among selected, specially organized databases on the network. Through the multiple linking of related data entities, textual units, or entire documents, the hypertext approach offers the user a network of alternate paths for self-directed, non-linear browsing and exploration of bibliographic and other document spaces. At this time, there are only a few hypertext OPACs accessible via the Internet.

To end on an optimistic note, there is good reason to expect that these new network access and retrieval technologies will have an impact on OPAC vendors and developers, motivating at least some of them to venture beyond second generation functionality. The Internet is marvelously hospitable to innovators, and it is a wonderfully public and influential medium.

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Document Delivery in the 1990s : Current Aspects and Future Trends

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Abstract

UMI can be considered as the first commercial on-demand publisher in the world. For nearly 60 years, UMI has been supplying documents in paper and microformats to libraries, information centres and research institutes around the world. In recent years, UMI added the capability of document supply in electronic formats. This paper discusses current and future forms of document delivery and "just in case versus just in time provision". It will also discuss some related issues such as preservation and conservation of different delivery media.

0. Introduction

Good afternoon ladies and gentlemen. I last had the pleasure of addressing this Symposium 9 years ago. In that time, our industry has experienced more radical change than at any other time in our history and it looks as if the pace of change will continue to increase. Just 9 years ago, in 1986, the first CD-ROM databases were just starting to appear on the market. It is very difficult to believe that something that we now all take for granted appeared such a short time ago. The advent of databases on CD-ROM has brought about one of the, if not the, major revolutions in the provision of services within libraries and information centres.

However, once you provide access to the vast range of sources that are accessible through abstracting and indexing databases, the demand for actual copies of original articles just skyrockets dramatically. Whereas in the past, people would have been content to look through their pet journals every month, they now have access to a much wider range of information sources containing information relevant to their areas of study. This in turn has necessitated a change in the way that libraries service the demand for documents. No library could possibly hope to provide all the references from all the databases they hold from their own stock. In fact this has become such a problem in many institutions, that I know of a couple of places which are actually cutting back on their subscriptions to abstracting and indexing databases on CD-ROM because they cannot meet the demand that they have created for the actual documents themselves. What I would like to do this afternoon is to go through various aspects of document delivery in the 1990s and then to give you some information about UMI's future direction with regard to document supply.

1. UMI - A World of Information

How did UMI get involved in this in the first place? UMI can actually be considered as the first commercial document supply company in the world. UMI was founded nearly 60 years ago in 1938 and its aim at that time was to use on-demand publishing to make available information which, for commercial reasons, could not be made available via traditional publishing methods. One of the first projects was to microfilm every book in the English language from 1475 to 1700 to preserve the heritage of the English language for future scholars. We are still carrying out that project today so you can see just what a huge undertaking that was.

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Also at that time, UMI started its programme of microfilming American doctoral dissertations and this programme has grown over the years so that we now have over 1,300,000 dissertations available as reprints and from all universities in the US, bar one. Many other institutions worldwide also participate in this programme. Over the years, UMI expanded its offerings and we started microfilming newspapers and periodicals and out-of-print books. It was during this time that UMI established the relationships with many different publishers which has enabled us to develop the products and services that we offer today. The letters UMI originally stood for University Microfilms International. However, as we don't only serve universities nor do we supply only microfilm, the name has changed and we are now just known as UMI.

2. Document Supply

2.1 Services and Formats

Let's start by taking a look at the type of document delivery services that are available now and the various formats that are on offer.

Services:

- UMI InfoStore
- CARL UnCover (Knight-Ridder)
- EBSCOdoc
- ISI - The Genuine Article
- OCLC Fastdoc
- BLDSC
- UB and TIB Hannover
- ILL

Formats:

- Paper
- Microforms
- CD-ROM
- Online

The list here is just meant to be a representative sample and in no way comprehensive. The various commercial suppliers like UMI InfoStore offer a variety of ways of accessing data. For example, some organisations will deliver tables of contents from journals directly to individuals' e-mail boxes. Most of the organisations provide items from their own stock holdings.

UMI InfoStore takes document supply a step further in that we offer a document search service. At the InfoStore there is a huge database containing information about where they can find many different types of document. Through agreements either with the end publishers or with the Copyright Clearance Centre in the USA, all items supplied are copyright cleared and the copyright fee is included in the end price. We have found that quite a few information centres have actually contracted out all their document supply to UMI InfoStore. Instead of undertaking their own document search through the interlibrary loan system, the libraries simply send their requests for any documents that they require to UMI InfoStore and rely on them for supply. This contracting out of document supply is becoming more and more popular in libraries where staffing levels and in-house collections have been cut just at the time when demand is increasing dramatically.

If we move on to the formats that are available, paper is obviously still the main storage medium. However, with the type of paper that a lot of information has been produced on recently, particularly newspapers, there is grave doubt whether they will survive in that form over the course of the years. Microforms, which are exact reproductions of the original items, have been subjected to various aging tests and most microform producers will claim that their microforms will survive for over 200 years.

On the surface, this would appear to be quite an easy claim to make as none of us would expect to be around to be able to verify this. However, we at UMI are still using master microfilms which we created when the company was first set up so we do believe that microform is an excellent storage medium. Additionally, even if you don't have any microform reading equipment, you can still access the information on the microform through a magnifying glass for example. Obviously, this isn't a satisfactory way of doing it but the data will always be accessible. With the new microform reader printers that are available, you can attach these to a PC and actually scan the images from the microfilm and automatically transmit them around a network. This type of equipment has really brought microforms into the electronic age.

Moving on to CD-ROMs, there has been a lot of debate about how long data on CD-ROMs will actually survive. Originally, there was talk of data degradation in as little as a few years. Nowadays, people are talking about 20-25 years as being a realistic estimate. However, a CD-ROM is useless without a certain level of hardware to use it. What happens if that hardware should become obsolete? Even if the data remains on CD-ROMs without degradation, will this data still be accessible in the future?

With data supplied online, you are totally at the mercy of the data provider. A lot of journals are available now in electronic format online and can be read at people's workstations and downloaded into their own files. The major concern here is with integrity of data and how you can prevent unauthorised changes being made.

2.2 Access Options

With electronic document delivery, there is a bewildering array of options available. I would like to go through the different options and say a little bit about the advantages and disadvantages of the different methods of access.

- In the beginning there were **abstracting and indexing databases** such as UMI's Dissertation Abstracts, Inspec and ABI Inform. Such databases are available in CD-ROM versions as well as via traditional online hosts such as FT Profile and KnightRidder. The advantage of CD-ROM versions is that the software has been developed by companies such as UMI in order to create top quality interfaces and search engines which are both simple to use and which best suit the structure of the databases including their extensive indexing. With online provision, the customer pays on the basis of time online plus information retrieved. The main advantage is that the user enjoys access to many databases via one common interface. The major disadvantage of course is that you cannot calculate your costs in advance.

  The advantage of one common interface is also offered where UMI's databases are accessed via library OPACs. The disadvantage here is that OPAC systems do not offer the field and index searching available with CD-ROM databases. Companies like SilverPlatter, Ovid Technologies and OCLC offer the advantage of a common interface across many databases and this interface is much more sophisticated than OPAC software but much more user friendly than the usual online interfaces. Most libraries want to concentrate on providing as few different interfaces as possible in order to avoid confusion amongst end users. For this reason, libraries may choose to focus on databases provided by one provider, for example SilverPlatter or Ovid.

Quality abstracting and indexing databases provide excellent focussed access which gives end users an excellent starting point for their research. However, as has already been stated, the abstract merely provides the starting point for people's research. What people require is the actual article itself.

- The next level of access is provided by **ASCII full text versions of databases** like ABI Inform and Periodical Abstracts. The full text can be searched, but you do not get the precision searching that you get when searching through a good abstract and index database. The main advantage is that the corresponding full text articles are very often available. Full text versions of UMI databases can be loaded either locally or increasingly at a remote location, effectively at an "online" host. The crucial differences between these new style hosts (e.g. Ovid, SilverPlatter and OCLC) and the traditional ones lie in the price structure they offer and also in their interfaces.

  The new hosts offer subscription-based fixed price access to databases traditionally accessed and paid for on a pay-as-you-go basis. As with library OPAC-based access, the end user often enjoys a more intuitive or familiar interface, where the old style host system has tended to offer a more complex sophistication, resulting in intermediary access.

- Let's move on now to **full image databases.** In the early 1990s, UMI pioneered the provision of subscription-based access to full image data sets created to match abstract databases and so to provide original article facsimiles. These scanned image databases contain cover to cover scanned images of the original periodicals. The CD-ROM-based products like Business Periodicals Ondisc satisfy a widely held desire for complete facsimile articles, even whole journals, to be retrievable. Whereas full text files will invariably mean substantially incomplete versions of journals (no graphics, letters pages, photos, advertisements etc.) full image products offer the power to print exact document copies and to see the original journal layout.

  Additionally, you have access to the tables of contents of journals, something which ASCII full text databases do not offer. The full image databases combine the best of all worlds in that they offer the complete searchability of the abstracting and indexing databases combined with the scanned images for instant on-site document delivery at a fixed annual cost. Up until now, the drawback has been that these databases were only available as standalone systems. Through UMI's ProQuest PowerPages, you can now network these image systems via your institutional network. This means that you can provide researchers with the ability to print out articles at their own workstations.

- The features offered by **document supply services** were discussed earlier. Obviously, the main advantage is that they offer the widest array of material but there will always be a time delay and the annual cost is unpredictable.

2.3 Key Decisions

Everyone today is talking about just in case versus just in time delivery. As library budgets the world over are falling, so libraries are having to turn away from buying items for stock just in case somebody might need them in the future. They are having to make hard and sometimes very painful decisions as to the type of service they actually offer to their end users. I know of one library in Australia which cancelled a very large number of journal subscriptions on paper and gave the money that they had saved on the journals to the individual departments. The faculty staff and researchers could use this money to buy the documents that they required. This seemed to work reasonably well for faculty members and postgraduates although the demand soon exceeded the amounts allocated to the departments for purchase.

However, the people that really missed out on this were the undergraduates. From having a wide variety of journals which they could use in the library, they suddenly found themselves with a very limited collection which was still held on site. Whilst faculty members may be able to afford to pay $20 for an article, I know of very few undergraduates who are in that situation. It seems to me that in the whole of this just in case versus just in time debate, it is the undergraduate population that is losing out on the provision of information.

Another Australian librarian told me that they frequently get undergraduates asking why, when the libraries provide abstracting and indexing databases which give them excellent references, when they go to find the actual journal article, it is not held within the library. In a lot of institutions, undergraduates aren't allowed access to interlibrary loan services either. A great deal of dissatisfaction is being created at undergraduate level because of this.

Another area of just in case provision which is not particularly satisfactory is in duplication of supply. It is highly likely that different departments or even different researchers within the same department will want access to the same articles. If articles are ordered by individuals, albeit with money supplied by the library for document supply, the library has no idea what has been purchased and so you could well get several people buying copies of the same article. It is extremely difficult to strike the balance between just in case versus just in time provision but it is very necessary in order to provide all members of the institution's community with access to the data they require for study purposes.

How will the publishers fit in with this shift towards just in time provision of data? I believe that publishers will still have a very important role to play in gathering, refereeing and disseminating data. People talk about peer group refereeing. This means that people will put their articles up onto different bulletin boards or lists on the Internet and their peers will referee the articles that appear there. That's fine if just a few articles appear, but who will have the time or the training to sift through large amounts of data? I don't know about everybody else here, but my desk is absolutely piled high with things that I have to read as well as doing my actual job. People who have the skills and the time to do this sort of thing are the editors at the journal publishers.

And what of the copyright issue? When the copyright rests with the publisher, at least they can take action if people deliberately alter or misuse data published in one of their journals. The current delivery formats of paper, microforms and CD-ROM have all addressed the copyright issue satisfactorily as have all the commercial document supply services, in that they pay royalties to the original publishers.

In summarising the options, there are several key criteria which need to be looked at when choosing the best means of access to documents for your institution for the future:

1. Just in case vs. just in time provision.
2. Level of expected demand: this will impact on whether you need a pay-as-you-go service or subscription-based access.
3. The need to provide end user access: this will affect the degree to which you spread the database around the organisation by CD-ROM networking if available, via dial-in access or via a local database load (e.g. for OPAC access).

4. The need to provide original article copies: most end users will greatly prefer full image copies, at least some of the time. Whether through document supply services like UMI InfoStore or, for higher demand situations, through image database subscriptions like Business Periodicals Ondisc, full documents offer the distinct advantage of containing key tables, charts and other graphics. Image systems also mean that the library will hold the full journal, in the manner of a subscription, and this may well be crucial to library, institution and users alike.
5. The desire to provide the fewest possible number of different interfaces: the most realistic solution may be to offer several interfaces around the institution, although increasingly it is becoming possible to contemplate having one interface to access all external and internal databases.
6. The need to download articles to disc: there may be a policy or culture in your organisation whereby downloading articles to disc is popular. The new range of options for both abstract and full text ASCII level access to databases like UMI's may be the key to enabling individuals around a site to download full articles for convenience.

So how do we at UMI see things developing in the future? We will continue to support our CD-ROM-based products, abstracting and indexing, full text ASCII and full image databases as these provide excellent on-site document delivery at a fixed annual cost. However, we are also developing our own form of online system which will enable anyone in the world with a personal computer and high speed modem to dial in to UMI's collection of information in electronic format and order article copies.

2.4 ProQuest Direct

The name of this system is ProQuest Direct and it provides a leading edge information delivery system which gives online, immediate access to a broad range of information sources in formats ranging from bibliographic citations to abstracts, full text and images.

ProQuest Direct is our new client server host computer system which offers a Windows-based interface to enable researchers to search all titles available in electronic format on the host system including periodicals, newspapers and dissertations. This type of searching does not confine the customer to searching only the contents of a specific UMI database such as ABI Inform, although people will have the option of restricting their searches to certain types of data or specific titles if they choose.

Users can choose to access information in a range of formats: citations, abstracts, full text, images, or a unique text and graphics format which gives you the full text of the article and the option to display each photo, graph, chart, table and illustration. You can then choose to have the documents delivered to you either electronically, by fax or even by mail. The system will offer you the option of onscreen document viewing at a lower charge before electing for your chosen method of delivery. Additionally, you will also be able to order items for which you have found the abstracts, direct from UMI InfoStore.

Pricing will be based on the information and format desired by the customer. Amongst the information included are the sources shown on this slide. They include databases which are available on CD-ROM and some which are new and only offered under this service. They also include other sources of material such as news from the New York Times and access to the US and foreign company data available from Disclosure.

ProQuest Direct varies from traditional online database systems in that you do not have an online connect hour fee, although you will have your normal communications charge as in the case of a telephone call. When you select different article formats, a price tag window appears to show you the cost. ProQuest Direct is accessible from a modem and it is also TCP/IP compliant, so you can have the choice of using a private link to the system, a value added network service like CompuServe or the Internet.

How will ProQuest Direct fit in with the other document supply services provided by UMI? The networking of the scanned image databases like Business Periodicals Ondisc through ProQuest PowerPages provides you with a high performance library system which will enable libraries to build local collections of high use information at a fixed annual cost. With ProQuest PowerPages, libraries just pay for an annual subscription to the databases and they don't have to worry about any varying charges or additional costs.

Document delivery services like UMI InfoStore are designed to provide access to those items which a library doesn't need to hold locally. UMI's online system, ProQuest Direct, is designed to provide access beyond a library's local collection of information and it is also meant for institutions or companies who don't require a local collection of material. We anticipate that high demand institutions, including many academic ones, will use ProQuest Direct as a more occasional supplement to the fixed price subscription packages available via the full image or full text services which were mentioned earlier.

3. Conclusion

At UMI, we believe that the document delivery options and services chosen will depend on the particular circumstances of a library or information centre. That is why we are offering the best of all worlds with the complete range of document delivery systems from locally held collections of material through to sophisticated online document provision.

In conclusion, we are all faced with a bewildering array of document supply options at present and the provision of documents via electronic means is only really in its infancy. We can expect many more services to appear in the next few years and whilst the revolution probably won't be as major as with the advent of CD-ROMs, these new services will certainly cause a lot of debate about document provision into the next century.

Educating Librarians for the 21st Century

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Abstract

An abundance of source of information can be expected to be the hallmark of the libraries of tomorrow and the task of today's library educators is to train the librarians of tomorrow. The computer has revolutionised data retrieval and with it the basic concepts of librarianship. This implies shifting from print to the maze of electronic superhighways. At the same time, a precise search requires from the librarian an understanding of the complexities of research methods. However, patrons, on all levels of computer literacy, must be taught to navigate the electronic superhighways, which means that librarians must acquire teaching skills and understanding of epistemology.

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Perhaps the most thorough change must occur in the attitudes of library schools to library techniques. Classification extends its importance into reference work. Verbal and non-verbal communication skills are important assets that must be taught to librarians as they imply both human-human and human-machine relationships. Management patterns must change under the impact of the electronic revolution, especially in the sphere of cost efficiency. Decisions regarding the purchase of hard- and software must be made on the basis of different other considerations than the acquisition of print material. The problem of access has emerged in a different meaning. Mostly we are facing an uncertain future with no practical guidelines to help us in decision making. How to train librarians for unpredictable future tasks is the problem of today's library educator.

Introduction

We seem to be in the middle of a revolution and like all revolutions known to history, we know that it has began, but there is no way to predict where it will lead and when and where it will end.[1] In the decades after WWII academia and librarians were bemoaning the abundance of information that was impossible to scan, let alone know. Now we seem to have gone to the next stage: such an abundance of sources of retrieval has been added to the proliferation of informative items that even finding a specific item requires expert knowledge.

As in all revolutions, perturbations occur in formerly well entrenched order: yesterday's master classes must give way to people with new skills or else acquire the new and discard the old, which is for everyone a difficult process. Yet the forces of revolution do not permit either deliberation or hesitation. They sweep the participants along and shape the events according to scenarios hard to understand and impossible to slow down. Thus it is with library education: library schools are supposed to create a new kind of librarian, when future trends cannot be predicted, when new technologies create problems overnight - the appearance of Windows 95 is a good example of such an upheaval - and when future needs can be subject to speculation and not to analysis.[2]

The computer was the harbinger of things to come. Considered by many librarians as the answer to all ills, it was fervently welcomed by some, while others regarded it with the distaste usually reserved for an usurper. Librarians, who had spent a lifetime creating manual catalogues with devotion to classification and cataloguing rules saw their magnum opus discarded in favor of an electronic device that was alien, independent of the traditional librarian and which seemed in general unmanageable. Only gradually the advantages became obvious and former negative attitudes changed into enthusiastic acceptance. At the turn of the wheel, the computer was lauded as the ultimate tool in data retrieval and was believed to have almost magic abilities to solve problems.[1]

Undeniably, the computer has revolutionised data retrieval: from CD-ROMs to Internet and beyond, the computer has become the overlord in the search for data, even though originally it was meant to be the slave of the librarian. It seems that programmers and computer wizards have taken the lead and the initiative in creating retrieval tools while librarians attempt to follow in the new paths as best they can which in some instances is not good enough.

Library School Curricula and the New Era

Looking at the library school curricula of the past decade, two major trends can be extrapolated. The first concentrates on library materials: cataloguing, classification etc. In the past the underlying principles seemed to be that if the library materials were well organised, the patron can be best served through reader services. The libraries accepting this philosophy must now re-orient to a state of art where electronic media reign, and will perforce have to change their basic concepts so as to orient services to the reader and to the librarians instead of concentrating on print material. This implies switching from print which gradually takes the backseat to the maze of electronic superhighways. The other type of trend is people-oriented, as has my school been from its very beginning. The user and the librarian were always the center of interest and now is the time to adapt to the constantly changing scene. Communication skills have always been part of the programme, and the verbal, non-verbal and lately visual communications skills of our students seem capable of helping the librarians in making the transition. The Library of Haifa University, which is mainly staffed by our own graduates made the change from books to electronics relatively painlessly, produced the necessary teaching materials for the use of the OPAC in record time and re-invented reference work with electronic materials during one summer break.[2]

Information retrieval in the new era is a two pronged affair: training librarians in the new mysteries of the electronic highways and in new approaches to the time honored reference interview which now must be conducted with the various thesauri and keyword patterns in mind. The number of new sources with their unstandardised classification schemes are particularly confusing. The new technologies also demand that the user presents a more precise definition of the subject than ever before and from the librarian's point of view, there is a need for more ability to find the precise wording that will ensure the best results for the patron.

All this implies that the librarian of today and certainly the librarian of tomorrow will need better understanding than ever before of the ways how a researcher works and of the complexities of scientific research methodologies. While research methods are part of the curriculum in some schools, the knowledge demanded of the librarian is becoming increasingly demanding, especially if we consider that in my country at least, as well as in some other countries, a large proportion of library students have a humanities background on the BA level and have little or no knowledge of research methods in exact and applied sciences, or even in the methodologies of the social sciences.

All this is well known, and essentially a platitude. However, library education in the middle of an information revolution means that on one hand the former goals and guidelines are no longer valid; I cannot go to look at curricula of other schools for guidance, as they are struggling with the same problems. It would be easier if virtualisation of the library were a certain and confirmed future: it could then be claimed that library education should be adjusted to a bookless library scene. However, it seems at this point at least that translating all of the accumulated booklore from the past until the 1990s is not going to be done overnight and we shall not be able to abandon the book entirely, thus making it imperative to adapt the book world to a different library scene all the while training our librarians in new, ill defined concepts. It is the uncertainty of what future technology has in store for librarianship that is turning the hair of library educators grey.

Changes in Reference Work

Reference work has already changed under the impact of the electronic revolution. Today's reference librarian needs to carry out completely new tasks: the reference department not only shows the patrons around and explains what the manual catalogues are for, but must acquire skills in epistemology and teaching techniques. These are subjects that are mostly to be found in the education departments and rarely if ever were thought to be a necessary part of training librarians. Librarians of today must teach how to use OPACs, CD-ROMs, DIALOGUE and a variety of other sources of information. Teaching patrons and remote users in the intricacies of Internet, WWW and all the other means of obtaining information is not for the amateur. It is a skill that has to be learned in order to be able to teach people of different levels of computer literacy. Thus, one of the many additions brought about by the information revolution into the library school curriculum is teaching methods. We have been teaching these for many years (having to do with a multicultural, multilingual population) but are now considering bringing in an expert in advanced teaching methods, such as hypertext to the MA level students.

Perhaps the most fundamental change that must occur is in the attitudes of library schools to library techniques. The field of information retrieval and the creation of precise and relevant bibliographic lists is changing rapidly. Compared to today's reference activities the ritual of reference work, that seemed hectic in its time, now seems a leisurely activity. The patron's need, the librarian's skill and the available tools of retrieval were always interwoven in reference work. However, today's sources of information are so numerous that finding the items that the patron needs but is unable to verbalise or explain, is most difficult considering the variety of thesauri and keywords. In some cases the search itself clarifies the problem for the user and the librarian who can now produce a list of relevant materials. Often the differences in search menus only serve to bewilder the user.

What underlies this problem is a question of classification. In the days of heavy tomes of Psych-lit or Sociological Abstracts, the material was classified in a number of very broad subject areas. The researcher had to wade through page upon page of entries irrelevant to the query in order to find a golden nugget. However, in the course of this longwinded browse one could find another useful reference, pointing to another broad category worth exploring. The computerised retrieval systems do not permit this kind of scanning the material. Only those items that are tagged under a particular subject are shown. Prima facie, this should make scanning the material easier, as the computer has made a preselection of useful items. Unfortunately, the computer is merely a machine and behind each source there are human minds doing the classification. If the classification does not include all available information under the same entry, or if the classification is somewhat biased, or, what is worse, is distorted by some misconception as to what the items really means, part of the relevant material will not appear on the screen and therefore it will not be available to the searcher, even though it may be a pivot source. The computer does not allow scanning what it does not list. Relevancy is therefore mostly accomplished, but precision is much more difficult to achieve, especially as the researcher may not be aware that he may be missing a major item.

Consequently classification skills which traditionally belonged to technical services now must become part of the reference librarians kit of skills and enable them to anticipate how a classifier may define an item and in what wording it may appear.

The Uses of Communication Skills

In addition to understanding how the mind of the unseen classifiers work, the librarians must understand how the particular environment of keywords and thesauri where conventional meanings are sometimes distorted in order to fit in with some general scheme. Who would expect that human-machine interaction should be also searched under COGNITIVE ERGONOMICS or that in order to find information on elks, one would have to know their latin designation (Dama). There are many curious items of this kind to trap the unwary patron and the librarian. This leads to the need to introduce *verbal communication* into the curriculum. If it has been taught in the past as an optional it will now have to be adapted to the new circumstances so as to train librarians to use language of both the patron and the machine effectively.

Verbal communication seems to be a necessary skill in a computer environment: the language of the computer being mostly computer lingo, the patron first coming into the linguistic milieu of computerdom is often confused: Boolean something, a menu (but no food), a key (that opens no door) and a bit (but nothing to bite on) sounds like a lot of gibberish to the newcomer. However, rules of verbal communication are applicable in this environment and knowing how to handle verbal interaction may make the transition from normal conversational speech to information science jargon easier.[10] Describing things verbally means correct deciphering of the partner's way of describing and understanding.[11]

The entrance of the computer into the traditional dyad of reference librarian and patron opens the way for an entirely different approach to communications: human-human interactions and human-machine interactions. The transaction between librarian and patron, which in the past was a face-to-face situation, now may occur through telephone with remote users, each seated in front of the screen. Even the face to face situation has changed completely. The patron looks at the librarian and intermittently at the computer screen while the librarian looks at the screen with short-term glances at the patron. Beginner's courses in communication stress that no real interaction can occur unless the participants are in eye contact. Now a new system of interaction must be invented that will allow the librarian and the user to stay in contact, even though no sustained eye contact is possible. From the individual solutions found by our reference staff, the following has emerged: contact can be maintained by talking and explaining what is being done by the librarian. Some keep their eyes on the screen for a minimum of time, others turn the screen so that the patron can see it and can participate in the search. It is probable that out of all this a new type of reference interview will emerge.[11]

In our curriculum verbal and non-verbal communication has figured prominently on the list of subjects. Courses in non-verbal communication deal traditionally with body language and gestures, when they are part of a library school curriculum at all. The spatial effect on people in an environment are an important part of the non-verbal as well. However, we taught spatial non-verbal effects with reference to the interior design of the library. Now we shall have to find ways of including ergonomics into our course material as the massive use of computers has completely transformed the meaning of non-verbal messages of the environment. We cannot speak of flexible seating arrangement as these are dictated by consideration of cables, networks and connecting links to mainframes. The problem of lighting, formerly mainly a question of giving enough light to the different areas of the library has now become a complicated balancing act between reading well on the computer screen and seeing enough for reading from books. These are problems to be solved by expert lighting engineers, but librarians must take into consideration not only the effectiveness of a certain amount of light, but also on the effect lighting has on the general image of the library. A well lit library is inviting and pleasant, but hard on the eyes of those reading on screen for any length of time. A library lit to please the computer enthusiast and the reader of full text on screen may look dreary. A library, so say the experts should have open spaces and vistas, otherwise it looks cluttered even if it is kept in the most meticulous order. Computers need their niches and partitions before they can be used without fatigue. Such a library may appear mechanical and perhaps even hostile to the reader. Again, non-verbal communication techniques may provide answers to librarians who have been taught how non-verbal mechanisms work.

Management

Approaches to management are also changing under the impact of the electronic revolution. Traditional courses of management have emphasised two main lines of activities: the management of the library itself, its staff, the coordination of the workload, the systems of supervision and problems of budgeting. The other line dealt with the relationships of the library with outside factors: the community, the local government, the public and governmental forces. While managing a library is not radically different from running any kind of organisation of the same size, budgeting and funding of the library present special difficulties. A general knowledge of management theories is a basic skill that all library school graduates should have.

Today's and even more tomorrow's library administrator needs a different approach to cost efficiency and budgeting. While books and periodicals made up the bulk of acquisitions in the past, the costs of a variety of hard- and software as well as the materials that go with them, such as CD-ROMs, the costs of Internet and other connections are part of the equation. The unrelenting warfare between major industries of hard- and software makes decision making about what machines to buy a very difficult proposition: by the time the decision has been made on the various management levels, the prices that were underlying the primary proposal have changed making cost calculations similar to calculating in the sand at the ebb of the tide. If one waits for a product to become cheap enough to purchase a number of workstations, it is probable that the product will soon become obsolete.

Consequently, the new librarian must be capable of handling an array of technologically advanced hard- and software. This does not necessarily mean that librarians should be turned into computer engineers any more that traditional librarians were not expected to carry out research in order to present patrons with precise information. Rather this signifies that librarians must now acquire such knowledge as is necessary in order to understand how the mind of hardware and software designers work in order to make the best and the most timely use of available resources. There is whole new field here to explore as what programmers truly believe to be user friendly may turn out to be anything but that, when an end-user of uncertain ability is confronted with a series of menus, which may seem as straight as a highway to the expert while seeming complicated and convoluted to the average user.

The library of the future has also raised again the time honored problem of free access. The problem of open versus closed shelves seems to be replaying itself in this modern transformation: should a university library, for example, provide for free, search materials that are available on the commercial market? Should the public library undermine the income of video shops and distributors, and can the PB compete with these outlets?

If the answer is affirmative, should the library system ask for payment on the basis of real cost, as a free donation to the library or give the service free? Should the university library, whose budget comes from a variety of sources, not all of them public, provide expensive services to the community outside academia. The question is not only of cost efficiency. In my country, for example, it is more a matter of ideology and politics, and the forces that influence the outcome of this debate are not always motivated by those arguments that the librarian would emphasize.

Any decision regarding hardware has its impact on the software that the machines can or cannot run and the library's management has to make another set of decisions. Thus we felt that it was necessary to add to our curriculum an expert in future trends of the electronic field, so that we can at least prepare our students to understand what can be expected to happen in another five to ten years, when today's tyro librarian is likely to have achieved a managerial position. Again we are faced with many uncertainties: the person teaching such a course must be capable of analysing future trends on the basis of the present, but the ability to think ahead, even if that thinking is somewhat speculatory is an indispensable skill to the future librarian. The librarians we are training today will work in the science fiction world of the 21st century and it is the unfortunate library educator who must prepare the conceptual bases upon which future librarians will act in ten year's time.

Epilogue

We are expected to create librarians capable of functioning in a brave new world while we cannot predict any of its main features with certainty. All we can do at this stage is to give our students as large a basis of skills and knowledge that may cover the expected with the totally unexpected. Library educators tend to have been librarians before becoming educators and many probably remember how different reality was from the image of the profession we had formed while still students. That kind of culture shock is probably inevitable. Let us only hope that the immediate future does not have too many surprises for our future graduates and that they will not come back to haunt us with: "Why didn't you tell me all this while I was in Library School!"

Notes and References

1. Some writers call it the "information society" that is taking form. Other writers seem to think that electronic inventions and means of recording information do not in themselves constitute a social revolution even though they certainly are a contributing factor. See: BIRDSALL, William F.: *The myth of the electronic library, librarianship and social change in America*. Westport, Greenwood Press, 1994.

2. The "information society" seems to be fast approaching even though it is conceptually ill defined as yet. BIRDSALL, William F.: *The myth of the electronic library, librarianship and social change in America*. Op. cit.

3. Rather than speak in the sweeping terms of "information society" which may or may not apply to the near future, it seems better to speak in terms of "information literacy" as does Margaret Chisholm in INTNER, Sheila S. and Kay E. VANDERGRIFT: *Library education and leadership. Essays in honor of Jane Ann Hannigan*. Metuchen, N.J., Scarecrow Press, 1990. pp. 59 - 79.

4. In his *myth of the electronic library*, Birdsall (op.cit.) describes the process by which an electronic library developed since the seventies, propelled by such thinkers as E. Dowlin and F. Lancaster.

5. Painlessly, perhaps but not without the upheavals that seem to be an inevitable consequence of success. Just as the whole team of reference desk had finished writing workbooks, guides and created the necessary instruction schedules we were informed that a new format of our national OPAC would have to be introduced. As all of Israel's seven universities use the same version of an OPAC, while the menus are designed by each library according to its own style, this in practice meant scrapping all the work done in the past year, redesigning all the menus, consequently rewriting all the workbooks, guides etc., and face bewildered patrons at the beginning of the term trying disconsolately to apply their former knowledge to the new menus.

6. At least in our curriculum, research methods are obligatory for those who do not have research methods in their BA level.

7. John DEWEY writes in his *How we think*: "Teaching may be compared to selling commodities. No one can sell unless somebody buys, but perhaps there are teachers who think that they have done a good day's teaching irrespective of what the pupils have learned." CARLSON, Ann D.: "The other Dewey: John Dewey, his philosophy, and his suggestions to educators." In: Intner and Vandergrift, op cit. pp. 109 - 127.

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10. FALZON, P.: "Human-computer interaction: lessons from human-human communication". In: *Cognitive ergonomics: Understanding, learning and designing human-computer interaction*. Edited by P. Falzon. London, Academic Press, 1990, pp. 51 - 61.

11. BOOTH, Paul in: *Introduction to human computer interaction*. Hove and London (UK), Lawrence Erlbaum Associates, 1989, pp.45-65, raises the question whether an interaction between a machine and a human can be considered a dialogue in the usual sense of the word.

12. DIX, Alan et al.: *Human computer interaction*. New York, Prentice Hall, 1993. Chapter 12, pp. 401 - 420 deals particularly with this kind of problems.

13. REHMAN, Sajjad ur made surveys of management course included in the curricula of a large number of Library Schools, and found a) not all schools in North America and in the UK devoted courses to management, and in many of those, management was optional. *Management theory and library education.* New York, Greenwood Press, 1987

Electronic Publishing : Availability and Legal Deposits

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Abstract

The publishing market is adapting itself to a new technology, and paper is no longer the only carrier of information preserved in libraries. The implications of this change are described, esp. those related to the libraries.

For Swedish university libraries, this means that they have to handle machine-readable documents in their legal deposit material and that departmental reports, that they have been used to archive in paper format, now come up as remotely accessed text files, with serious problems in preservation, authenticity and weeding.

Recent developments in cataloguing rules and in standardization have taken place, and the result of those efforts are described in some detail. Especially, it is shown how and in what respect libraries and other bodies managing information share the same difficulties and can gain from cooperation.

Libraries are advised to cooperate broadly and to try to take an active and early part in the discussions and development of techniques that is going on within various bodies active in the market-place.

> *The Library, formerly the Library of Congress, no one calls it that anymore. Most people are not entirely clear on what the word 'congress' means. And even the word 'library' is getting hazy. It used to be a place full of books, mostly old ones. Then all the information got converted into machine-readable form, which is to say, ones and zeroes ...*
>
> *... Since then, times have been leaner. He has been learning the hard way that 99 percent of the information in the Library never gets used at all ...*
>
> *... The Librarian daemon looks like a pleasant, fifties, silver-haired, bearded man with bright blue eyes, wearing a V-neck sweater over a work shirt, with a coarsely woven, tweedy-looking wool tie. The tie is loosened, the sleeves pushed up. Even though he is just a piece of software, he has reason to be cheerful; he can move through the nearly infinite stacks of information in the Library with the agility of a spider dancing across a vast web of cross-references. The librarian is the only piece of software that costs even more than Earth; the only thing he can't do is think*

These words are Neal Stephenson's in Snow Crash from 1992.

With all respect to ones and zeroes, but runes, old manuscripts and even real books have survived in spite of war, natural catastrophes and interruption of the electric supply. So with this in mind the question is: do we, the people of today, have the ability to be far-sighted enough when dealing with electronic documents? Every day we are told that we are living in an information society, a society which gives us a world without limitations and a world without boundaries.

One of the most solid phenomena in the world is the library, a place where human knowledge has been gathered, kept, preserved and passed on from generation to generation. And in spite of the enormous technological revolution in disseminating information, the library is still there, even if the virtual ones try to threaten from cyberspace and very persistently state that it is in cyberspace that all possible knowledge exists and should exist.

As librarians we talk about information simply as information, as one concept, but in reality information exists in two different worlds, in the human world or the real library world and in the computer world or the virtual library world. Very often, the two worlds are mixed up, and the result is confusion. Information in the computer world is transmitted in bits representing zeroes and ones. In the human world information does not come in bits. And information transmitted in the human world is not there until the receiver user starts to interpret it. A computer cannot by itself make use of or handle its information, and a book can not read itself.

We can go on storing information in libraries and in computers and keep it there forever. But who would know it is there? Who can handle and make use of all the information that comes marching towards us on the electronic highways? What we really need is information presented to us in the right format and in ways that make sense to us.

It is not for us to decide what future generations will find interesting. Today, we try to arrange the handling of electronic documents within our existing organizations, but so far it is only 'not very good temporary solutions'. We all know that information stored on floppy disks from yesterday is almost impossible to get to today.

- Who will be responsible for preserving the cultural heritage to future generations?

- Shall the national libraries and other libraries receiving legal deposits be forced to keep all generations of computers to be able to provide access to electronic documents?
- Will it be possible for future researchers to get an opinion of the hottest topics of discussion from our time, if all discussions are held in Internet, and what will happen to the electronic articles based on these discussions?
- Is it possible that the documentation of the birth of the electronic era in zeroes and ones will be the big black hole in the future?
- Could it be that we need a printed version of all electronically published articles, just in case?
- Is the pendulum swinging back again from *just in time* to *just in case*?

Dealing with this type of problems sometimes resembles the breaking in of a wild horse, a "rodeo": you should be in the saddle, on the horse's back, and making your will known by reins and stirrups, but very often you find yourself unsaddled, if you do not try to cling to the tail in an effort not to loose contact with the actor, although your own efforts are quite worthless.

To the last question, "Is the pendulum swinging back again from 'just in time' to 'just in case'?", we should be inclined to give a very definite answer in the negative to this part. We, the librarians, must live up to our professional standards and show that we are not dependent on paper as carrier of information. But we must introduce some new thinking into our lives to reach that goal, and for the digital storage of all kinds of information, we should have been much less sure. You all know that in analogous storage, such as conventional microfilms, you must keep track of generations and accept some deterioration if you copy from a copy of a copy etc.. In digital storage, each new generation represents all features of the preceding one and can even be enhanced, since checks can be introduced that prevent all loss of information, and additional features can be added facilitating access and use.

So, there is absolutely no need to have antique computer hardware available in the library. What must happen is that such carriers as are about to become obsolete are monitored and their information copied to up-to-date media. In this run, you have to adjust to updates in technology such as improved compression or image storage. This means that the libraries of the future will have to be less concerned about the documents, i.e. the carriers together with the information carried, and will concentrate on the information.

However, there are today no resources for this kind of preservation inside our organizations. They have to be created, equipment and staff must be acquired, and some way of monitoring and assessing development must be found. In this kind of work, we should react, but admittedly, we are most use to reacting. Cooperation nationally and internationally must be favoured.

So far, availability. What happens in legal deposit, the second part of the facet we have to cover?

Here, we see a very typical instance of trying to steer the horse by holding its tail. Several countries have recently updated the legislation related to legal deposit, in the direction that all kinds of documents published as carriers of information are to be delivered to the libraries or library-like institutions involved. And what happens? Important sections of the publishing community are abandoning all sorts of distribution of physical carriers and are migrating towards online or net publishing, if they can survive at all.

But also within the modern legal deposit acts, and the material they cover, we run into strange situations. Most laws seem to exclude software and online databases from legal deposit, and that stand is easily defended. The Norwegian law requires legal deposit also of online databases, but that law is barely working. Recent information tells us that they are about to adopt it in such a way that deposit is replaced by access, as long as the database is alive and updated; when it becomes inactive, the final version will be delivered for archiving. Furthermore, legislation covers all kinds of published documents, also sound and video recordings, films and broadcasts, radio and TV, which is good despite the size of the material. (For Sweden, the yearly legal deposit of TV, film and video amounts to 200.000 hours.) What is not so good is that multimedia items tend to be regarded as sound and or video and not as text, so in countries like Sweden, where special institutions and not libraries get the sound and video material, the library world has to acquire the multimedia documents it needs by purchase.

What is lacking, and what is being done, towards learning to handle machine-readable publications in libraries?

Firstly, we must acknowledge the following new features and their implications:

> The new ways of publishing - what are they, and what problems or difficulties do they imply in
>
> - distribution and integration
> - availability
> - authenticity
> - legal aspects
>
> The new kinds of documents - implications for
>
> - preservation
> - lending

It must also be kept in mind that this new situation is at present felt only in a part of the sector. Publishing meant for the general public, serving everybody with literature mainly for leisure, is likely to remain relatively unaffected by the migration towards machine-readable documents, at least as long as you do not have a low-cost gadget as versatile and reliable as a book to take along in your pocket, into your bed, into a cosy chair or wherever you want. I say so despite recent information that ability and will to read longer texts is losing ground and that the average time spent by adults watching TV is somewhere around 30 hours a week in the US.

But all kinds of reference works, such as dictionaries, encyclopedias, cookery books etc., as well as instructional material for all kinds of activities are likely to be offered in both shapes, and before long, the machine-readable version will dominate. The first reason to buy a home computer was - according to the promotion - the possibility of getting a decent file of your cuttings of kitchen recipes; now you can buy a multimedia cookery book for less than one hundred marks, albeit with US measures. When you come to monographs meant for specialist scholars, you may find the paper version holding its ground for some time more, but then you should remember that its role is very much restricted to the humanities and related sectors.

Something similar may happen to serials. Newspapers are competing with net-born news services by offering net services themselves, although so far, most people appreciate having the paper copy with their breakfast, on the train and so on. The popular press could be regarded as equal to popular monographs. In scholarly journals, however, you have the common feeling that we will see very great changes in what is appearing and how it is published.

After some years of concern as to the transition from paper publications to CD-ROM publishing, it has recently dawned upon the actors concerned that the whole world of scientific publishing is likely to change away from needing things like journals to get the new research results out. Once you start making preprints available on a network for free comment and free to use, there is no longer a market-place for journals, and they will disappear. A few forces act the other way round, mainly copyright issues and the need for the scholar to have a publication by which to verify scholarly merits. We strongly believe that in the long run, there will be other ways of meeting these demands.

So far, the forces that we, the librarians, can not control but have to be aware of. One of the minor difficulties is that we have to unlearn to build holdings of the most important journals in our respective subjects, and instead we have to learn where to find the information needed by a scholar and to teach him/her how to find it. Since subscriptions take a very substantial part of our budgets, this shift is welcome, as long as the new system does not run into even higher cost all included (more library staff is likely to be needed).

Generally speaking, we, or our institutions, must show our ability in coping with this new situation, and the challenges could be summarized like this:

- Learn to manage a composite library consisting of all kinds of material, from papyrus and parchment to the machine-readable media still to be evolved.
- Learn to accept the fact that your own institution is just part of a universal virtual library, where you and your colleagues elsewhere share as a common resource a vast material that is accessible only remotely.
- Teach our users how to access and use all these kinds of material.
- Safeguard the authenticity of the documents or information entrusted to us.
- Preserve the documents or at least the information entrusted to us.

But, generally speaking, the real challenge is in the need to integrate these new publications with earlier heritage and form a unified source of information. This need for integration is greater still in archival institutions, handling unique copies of documents.

A favorite tool for managing a library is the catalogue of your stock. It says a good deal of the development that the existence of computer files within libraries was acknowledged by the authors of the AACR, 2.ed., back in 1978, and that the rules for the description of a machine-readable document have been thoroughly revised twice after that. Strictly speaking, it is not the AACR that has been revised but the ISBD(CF), International Standard Bibliographic Description for computer files, one of the family of description rules managed by IFLA and acting as a de facto standard for this part of the library activities.

The latest of these revisions is very recent. It was made in April, this year, by an ad hoc group that met at the Library of Congress during three days, after which there was a document which after some editing was presented to the IFLA Section for Cataloguing during the Istanbul meeting in August and is now out for a world-wide review. The more remarkable new features in this set are the following:

- All documents that you can access on the Internet or similar networks are to be regarded as published, from the cataloguer's point of view.
- Distinct rules are given for information on the nature, kind etc. of the file and for information on the carrier, and these two data elements are separated from each other.
- In the records, emphasis is given to statements on the source of the title proper, on system requirements for the use of the file and on the mode of access, i.e. the way of reaching a file by remote access.
- Several detail rules are formulated to be amenable towards new technology and future changes, thus trying to avoid frequent revisions in the future.

The new edition may be published late 1996, after the IFLA conference in Beijing.

So, cataloguing rules are being revised to accommodate the new situation, as far as description is concerned. Popularly, it is argued that the choice and form of entry elements are common to all library material, which is true for the record as such. It must however be pointed out that electronic publications often do not have the formal title page of conventional publications, that may complicate matters. On the other hand, the text itself may be formatted in a code such as SGML or HTML that may lend itself more conveniently to automated formatting of the catalogue record than do ordinary printed title pages and abstract sheets.

So, a single library or library network has no difficulties in creating the catalogue records needed to manage the machine-readable documents physically kept by the institutions concerned. Another and much greater problem is how to acquire a cataloguing of the remotely accessible files that are relevant to the coverage of the library.

It is to be expected that the publication of research reports in printed format will decrease drastically and that it will be replaced by publication via institutional WWW servers. Some of these documents were issued under such conditions that they were delivered as legal deposit material, while others are more internal. Especially in the university world, departments have their report series, and we as a university library have a special responsibility as an archive of these reports, regardless of any legal deposit act. We will soon hear Mr. Stephan's talk on Die Deutsche Bibliothek as the national archive for electronic publications, that must be expected to cover also remotely accessible items. As a principle, Swedish university libraries try to find ways of becoming such archives for their parent bodies, although so far success is limited.

In this context, another recent initiative from the ISO organization is worth describing. At a meeting week in May this year with ISO Technical Committee 46, Information and Documentation, the two subcommittees on Automation and on Document Identification etc., respectively SC 4 and SC 9, had on their agenda various items bearing on this sector, first one on the need to establish a recognized standard for the names and access modes for networked electronic resources.

As several of you are well aware, the Internet web is a very complicated body of cooperating hosts, and behind the surfing supported by Mosaic or NetScape you see repeated accesses to services identified by strings of characters. A document available by one of these resources is in its turn identified by a string beginning by the resource string and going downwards in some hierarchy until the home page or the document is reached.

The new acronyms to be understood in this context are

- URI Uniform Resource Identifier
- URN Uniform Resource Name
- URL Uniform Resource Location
- URC Uniform Resource Characteristics,

and URL, the syntax and semantics of formalized information for location and access of resources via the Internet, is the most important one. It even has led to the definition of a separate USMARC tag, 856, Electronic Location and Access, with subfields also for less automated ways. Later on, you will find the contents of this tag used as a link to the storage - click on the tag, and the access is established.

Now, it is very typical of the situation within the ISO work that the main actor at this meeting was a representative of the Internet organization, the Internet Engineering Task Force, which had established what they called the URI Working Group. What was presented was more or less a fully developed technical standard, distributed for comment on the Internet and on its way to become a de facto standard without having the status of ISO behind it. It is a fast process, and related to a definite need, but the chances for a broader library world to influence the process is very restricted.

Thus, and understood that library catalogues throughout the world are easily accessible, cataloguing of the remotely accessible documents would become automatically a cooperative issue managed very close to the source. This would bring about some more advantages:

- It is easy to be informed by the author when the document leaves the preliminary stage and is ready to be filed as the first version of a real paper. This prevents the catalogue from being overloaded with garbage.
- The author can be asked to cooperate in subject indexing.
- The copying of the file itself from a departmental server to a server under library control, where the document will be permanently stored, is easily managed, in connection with cataloguing or at a later stage.
- And, by this, an authentic copy of the document as it was at the time of copying from the first server, is maintained.

This will definitely not mean that all documents made available will be catalogued and stored forever. The cooperation with the author will ensure a decent selection in the first place and a decent weeding of obsolete versions, and it is unlikely that items spread by news or BBS's will ever be covered by this program.

For, if availability can be ascertained by ordinary and well known library methods, the techniques for ascertaining the correctness or authenticity of the document are unknown to libraries from before. However, they are well known to archives, as well as to certain sectors of the community where large amounts of data must be machine managed under absolute control. During the same ISO meeting that was mentioned above, a joint meeting of the two subgroups was given almost entirely to problems connected to securing electronic documents.

Admittedly, an electronic document may be altered

- accidentally during editing or transmission or while in storage
- intentionally and with good intentions
- intentionally and with bad intentions,

the last in order to compromise the author, for personal gain, for fun or whatever. Of course, a paper document can also be altered in the same ways, but you can rely on other copies and on careful investigations on the carrier to see which is the original version and which is the altered one. In machine-readable documents, downloaded or copied between hosts or personal computers, the number of coexisting versions may be considerable but we do not know the status of the display at hand. This is the more annoying since researchers need to be able to show what they have done, as part of the personal competition, and later researchers will need to be able to cite earlier work with due respect paid in citations and all that. For both of these needs, authentic copies must be kept and located, and they must be kept so that they can be accessed without risking being changed.

Technical work for this is already being done, up to the needs of financial world etc., and libraries should define a role for themselves in this area. It goes very well with the idea mentioned above, that of the institutional library acting as an archive for the electronic publications emanating from the institute: what is needed is to make the financial securing techniques interwork with bibliographic requirements. The subcommittees of ISO TC46 involved were adhered to establish a fast working ad hoc group to establish a standard for this function in libraries.

In this matter, *we must remember that archives share the problems with us* and that they may become urgent earlier in archives than in libraries, since archival documents may have legal importance to a greater extent than library material. We should investigate what ICA, International Council on Archives, is doing and offer our help.

Some details mentioned above have been left aside, e.g. the legal aspects and the physical preservation. For the legal aspects, this is due to the fact that the largest legal problems will appear in the field of charging for the use of online services, in use, instead of having paid a fixed price for the indefinite use of a copy, by acquiring a volume. Physical carriers with electronic information, delivered in legal deposit, make no real difficulty since they are produced to be sold just like conventional paper documents.

But we both feel that we see before us a time of integration. There is no longer a defined process of authorship followed by the publication process, and the author uses coding that can be used both in typesetting and in indexing. The same word-processing is used in offices and in research environment. Standards and rules are set by the bodies that gain most from it (the main actors in SGML implementation in Sweden are not publishers but high-tech industry such as ABB, Ericsson and Volvo who need it for their technical documentation).

Then, libraries can not go on being stubborn and isolationistic or try to reinvent the wheel. We must be sensitive to news coming up in different places and cooperate with bodies like Internet Engineering Task Force, ISO (with technical committees working at micrography, computing, imaging), and our own IFLA and ICA. Above all, we must try to look broader than we have used to. In that way, we may know beforehand what is coming and also maybe influence a little what is coming. The market as such is so big that our views must come in very early if they shall mean anything - once a process is established, it won't mean a damn what we say.

We will add, somewhat boasting, that the three Swedish agencies most concerned, the Royal Library, the National Archives and the National Archives of Recorded Sound and Moving Images, have commissioned a consultant to make a joint study of all aspects of preservation and access. The report is about to be published, it is included in the reference list, and we have had access to a preprint of it, for which we are very grateful.

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Die Deutsche Bibliothek : The National Archive for Electronic Media?

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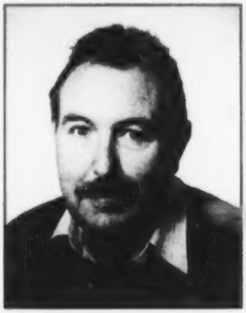

Werner Stephan studied civil engineering and geosciences. He has been a librarian since 1979. For several years Mr Stephan was responsible for the establishment and coordination of the German subject authority file at Die Deutsche Bibliothek. He is currently Director of Central Services and Archiving and responsible for all services to the public at Die Deutsche Bibliothek in Frankfurt and the National Bibliographic Services including the development of new services. He is also active in IFLA and ISO associations as well as in European (EU) funded projects and committees.

Abstract

Die Deutsche Bibliothek collects the publications (text, pictures, sound) which appear in Germany by legal deposit and publications from abroad which appear in German. The given law forced us not only to collect these materials but also to announce them in the national bibliography, to archive them in a proper way, and to give users access to the documents. Information and knowledge are distributed not longer only on printed paper but also in new forms which are referred to as electronic publications. We are convinced that publication must be defined from the content and not from the form in or on which it appears. An electronic document is one (or more) object carrying information for reading, viewing and/or listening, the content of which cannot be rendered without the aid of electronic equipment. It may appear on physical carriers or in a non-physical form online.

The proliferation of electronic documents, both from original sources and for the conversion - mostly by digitalization - of traditional documents, calls for increased attention to the questions of preservation and access of these documents.

0. Introduction

In the last few years we have heard that the print will change over the next decade, but actually we have the impression that the print will not change as much as proposed. But what is going to change is the publishing paradigm. We followed for a long time a print-based-model: print, publish, and distribute information resources. This mode of information production, distribution and use will change dramatically, now we have the chain publish, distribute and print on demand! And that fits not only for the online documents, but also for all other electronic documents on CD-ROM, diskettes and so on.

Some authors noted that our print-based culture is under attack and the on-demand and just-in-time delivery concept is telling us that it is time now to consider only on printing what you need when you need it.

This is a problem libraries and other information providers didn't solve: "when" is not defined! Does it mean now, in 1 year, in 5 years, or in 10 years? The conclusion is that people need a place where they can find the information at any time, we are convinced that this place should be a library.

Die Deutsche Bibliothek is in the lucky position to get a new building, like some other national libraries, and we use this circumstance to integrate some of the technical possibilities getting access to electronic media in the planning of the building. Nevertheless our plan is a step by step solution, as you may see later in the paper.

1. Fundamentals

Die Deutsche Bibliothek is committed by law to collect completely the publications published in Germany (text, video and audio) and publications in German language published in foreign countries. The publications have to be catalogued corresponding to the rules for national bibliographies, to be preserved and to be made accessible to the public.

The statutory regulation of the legal deposit for national libraries is in nearly all countries of the world the basis for preservation and documentation of their cultural and scientific heritage.

Information and knowledge are still not longer provided only in a printed form. New forms of electronically available publications are more and more produced, either on a data carrier (CD-ROM, floppy disks, etc.) or on a computer net (computer and net as a new medium). Especially for science and universities they are quickly gaining importance.

The fleetingness and fragility of electronic publications mean new problems in preserving the originals. As important a confession to books and serials is, as correct is the realization, that the legal deposit regimentation without consideration of new media is loosing its meaning and function.

Access barriers in economical, political or technological forms cannot be excluded. Several national libraries already come to the obvious conclusion to re-define their collection order (Library of Congress, Bibliotheque Nationale de France et al.) or they have prepared legislative measures (The British Library for example).

Die Deutsche Bibliothek is with the now valid deposit law in the position to order and collect at least those electronic publications which are physically distributed.

Since of the specific requirements for hard- and software considerable economic burdens are arising. The requirements for the composition (documentation, usage of the software) are not clearly outlined, and the possibilities for a standardized concept to make the publications accessible for the public (information server) are not yet given.

In view of technical possibilities of distribution the division in physically distributed and per net distributed publications is only fit for limited duties.

Therefore Die Deutsche Bibliothek directly follows from its general duties a conclusive duty to collect electronic publications. Publications cannot be defined by their form of storage, they have to be defined by their content. This is the only way to match as well the requirements of the scientific and economic location Germany.

The initiatives of the European Union and the countries grouping called G7 show how important the theme "electronic library" is classified. In these plans Die Deutsche Bibliothek plays an active role. The plans confirm that the information infrastructure has to consider a net between national libraries due to the fact of strong internationalization of electronic publications. Therefore there must be concerted actions. It is an advantage that at the same time the three biggest national libraries in Europe are building their new houses: La Bibliothèque Nationale de France, The British Library, Die Deutsche Bibliothek.

Since electronic publications are becoming an increasingly important subset of the total publication output Die Deutsche Bibliothek is convinced that the role of deposit can only be maintained if current deposit regulations covering printed publications are expanded to include electronic publications as well. To fulfill our duties we have to recognize several aspects. We didn't already find solutions for all problems, but we are getting closer and closer to the goals.

2. Guidelines for Collecting

The publication has to exist in an electronic form and has to be open or accessible to the public. In the sense of our copyright law the publication of databases means it is intended for distribution. In any case this law is effective for electronic publications on physical media like floppy disks or CD-ROMs.

Publications on storage media can be divided into three groups:

- those which contain regular information which can only be read;
- those which contain user programs and fixed information (educational and exercise programs);
- those which contain only user programs.

Operating systems won't be collected as well as data storage which are not containing text, video or audio materials, as well as computer games and data storage which are only meant for business or internal use.

There can be restrictions in collecting because of software or hardware factors.

Publications in a net - which naturally are dynamic - will only be collected by archiving journals (downloading). The intervals can be different depending on the demands for currency. There are some problems with definition and classification (language and nationality, criteria of qualification, definition of publication or issue, etc.). Because of missing experience, a gradual procedure is necessary and of course we are in discussion with publishers. At the moment we are thinking about a similar regulation as the Norwegian one.

A quantitative estimation is difficult. In medium term we can expect 3,000 - 7,000 publications on floppy discs and 3,000 - 10,000 on CD-ROM. The electronic product has to correspond to the same composition requirements as the printed media, especially it has to be delivered completely with packing, documentation, handbook, but as well with software if it is necessary for the usage of the product.

A delivery obligation may exist - as well as for publishers and producers - for providers of databases (host) or gateways. Decision must be made

- on a complete or an exemplary collection,
- if there should be a preference for data storage by parallel publication forms
- and about financial compensation.

3. Archiving and Long Term Preservation

Two capabilities will be decisive for the questions if Die Deutsche Bibliothek can fulfill its duties:

- to keep printed media as well as electronic publications open for following generations and
- to undertake digital retroconversion of former publications in a convenient way.

This means not only a reliable technology and the transformation of electronic publications to new technologies respectively the copying in certain intervals because of its limited durability. It means as well to give durability to short life information on private servers by preservation in time.

The basis for long time preservation is to find a most common concept for archiving which comes through reformatting and conversion out of the individual form of distribution and usage. The technical solution is determined by the life expectancy you can reach with it, the obligation because of standardization and the possibility to cooperate with other institutions.

4. Archiving and Usage

From the first day on, the archiving of electronic publications has to consider the accessibility. Therefore a concept with a central server in a fast local net is most suitable. The net has to be connected through open gates to wider nets. The usage in the library takes place at multimedia workstations in the reading room. It is as well as the usage on printed media free of charge. So it is guaranteed that the legal agreement about the rights of usage (electronic copying and the further usage of the data) are respected.

We plan for the future that the usage by other users at home or in office through open nets will be charged. Apart from fees for the library, the costs include license fees for publishers respectively producers.

With its own databases, Die Deutsche Bibliothek will become an important communication knot in the international net of data highways. Providing of information therefore takes place in close cooperation with other national libraries. With its new net concept Die Deutsche Bibliothek gains a new functionality. Apart from the function as an information server Die Deutsche Bibliothek has the possibility to provide, as a caching server, services from other national libraries for German libraries and to provide the gateways. Out of this step by step a virtual library will arise. In the past, experiences with divided databases had already been made on the field of national bibliographic services.

5. Bibliographic Control

Long term preservation is one aspect, bibliographic control the other. Only precise bibliographic key words enable a controlled access and, at the same time, the preservation of the knowledge about the intellectual ownership. National libraries have always been the most important producers and suppliers of national bibliographic services - nowadays in an electronic form. They have to create the corresponding rules for cataloguing of electronic publications and the rules have to be used internationally as a standard. Therefore multilingual authority files on divided servers have an increasing importance. Electronic publications are providing further bibliographic tools as well. This means the linking of bibliographic data, contents, abstracts and structured full texts; hyper links between multimedia aspects; navigation tools in nets; information about quality, costs and status of publications (value-added-papers). Again, the national libraries as net knots have to play an active role.

6. Computer and Net Concept of Die Deutsche Bibliothek

Electronic publications are not only containing texts. They can contain speech, texts, documents and pictures in one application. Therefore the architecture of a system has to be built in a way that different media within the system can be stored, transported and shown. If one is thinking about a durable standardized storage medium which stores multimedia data of digital form in a standard format, the CD-ROM respectively WORM could be suitable. It has been predicted that in five years magneto-optic media will be available, which enable a long term preservation of about 100 years. These media are already part of the standardization.

The complete system for the online presentation of electronic publications can be divided in six components:

- System of CD-ROM servers (several servers and jukeboxes)
- Central multimedia server (a high power UNIX workstation)
- Service center (products for users)
- PCs for users to log in
- Net
- PCs for installations

For the planning of the net the multimedia character of the usage has to be considered, this means real time connections / high-speed nets.

As a backbone system ATM is suitable which is available as an international standard from 1996 on.

For the digital retro-conversion of texts, as mentioned before under point 3, a system for archiving should be considered which has the following characteristics:

- Scanning of documents
- Administrating indexes to the documents
- Storing data on suitable media
- Providing help to find an archived document in the easiest way
- Delivering demanded documents from the archive and giving the user access to it (document delivery)

7. Divided Information Systems - A Look to the Future

A very important characteristic of electronic publications is great independence from location and time of usage. To bring this characteristic to advantage, the electronic archive has to be accessible through standardized communication ports for users from outside as for example the SR/Z39.50 protocol and the OSI respectively TCP/IP protocols.

The interoperability on the basis of international standards especially allows the following applications in divided information systems:

- Searching in linked OPACs
- Full text retrieval for electronic publications
- Linking of searching, ordering and delivering of documents
- Searching of and within multimedia documents
- Navigation through structured electronic documents

The services will be provided by information servers with suitable software which are linked to the Internet to provide access to external users. In the same way the information client has to be provided.

8. Conclusions

Since we are discussing the integration of electronic publications a number of issues have become clearer to us and some conclusions can already be drawn. But at the moment the question mark at the end of the title might be still the most important part of the sentence.

National libraries have to find solutions for how to archive, how to access and how to provide long term preservation of electronic publications, including bibliographic control and criteria of quality. The extension of the legal deposit is urgently necessary. Therefore, soon investments in the infrastructure of information have to be made.

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The Impact of Electronic Publishing on Library Services

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Abstract

In June 1995, the library committee of the German Research Association (in German: Deutsche Forschungsgemeinschaft, DFG) published an official statement concerning the impact of electronic publishing on the services of scholarly libraries. The committee intended to give guidelines for librarians as well as for the German Research Society itself on account of supportive measures.

The explanation highlights that every discipline has a specific information profile. In consequence, there is a wide variety how to meet these needs. On the other hand, electronic publishing shows absolutely new capacities, which mainly focus on very high storage, disembodiment of the media, change in the kind of providing, ubiquitous availability and the floating nature of documents.

Librarians are compelled to re-orientation unless they risk their profession at all. Since the publication chain has been broken, room for new cooperation and partnership will grow and, in turn, competition will increase. Substantial issues on the agenda are: long-term availability, balance between purchase and intermediation, indexing in a state of flux and the role of libraries as publishing houses. The German Research Society is willing to engage in these fields by promoting appropriate studies and by supporting worthwhile projects experiments included.

Introduction

A few months ago, in June 1995, the library committee of the German Research Association (in German: Deutsche Forschungsgemeinschaft (DFG)), published an official statement concerning the impact of electronic media on the services of scholarly libraries. The committee intends to give guidelines for two purposes. First, it will offer some guidance for librarians on how to find a path through the maze of problems. The second aim is to deal with possible supportive measures of the DFG, which meanwhile have led to a specific programme open for application and peered by a subcommittee especially dedicated to this subject. Today, it is for the first time, that the librarians' community is being informed about this new programme, whereas the original German version of the June statement has been published recently.[1]

The paper has been elaborated by a task group consisting of three professors of different disciplines, two librarians, an information scientist and two members of the DFG library department. By the way, it was my part to chair the small group. I feel very honoured to present essentials of the paper to you as an international audience. Since the topic is international, just the interpretation and the realisation differs from country to country. The report puts emphasis on some of the many problems connected with the creation or enhancement of digital libraries.

The statement has nine chapters. After a general introduction, chapter 2 explains the crucial features of digital publications. Chapter 3 postulates the necessity of an absolutely re-orientation in librarianship on account of the quantum leap in the information landscape. Chapters 4 to 6 reflect the issues of long-term availability, purchase and access, cataloguing and indexing. Then, in chapter 7 some perspectives are given in terms of the role of libraries as publishers, whereas in chapter 8 necessary conditions of the legal and technical frame work as well as standards and fees are specified. The last chapter briefly sums up the present position of libraries and scholarship in Germany, followed by the result of these considerations: what to do next.

I assume and feel that for our purposes today it is less useful to concentrate on the features of technical innovation or visionary thinking or to deal with the exciting topic of long-term storage. Instead it seems to me more helpful to underscore and to point out some essential, nonetheless too often neglected conditions on the one and consequences on the other hand. If you may agree, this is a somewhat personal point of view - possibly and hopefully more appropriate for instigating some lively discussions. I am going to propose three theses.

Thesis 1: The Variety of Working Methods will Increase

The members of the task group do not believe in a uniform role and identical importance of digital publications for the entire scholarly world regardless of subject and topic. On the contrary, we believe that every discipline has a specific need for information, a specific information profile. Consequently, there is a wide variety of how to meet these needs. It is not or at least not merely a question of being or not being familiar with the new media. It rather implies an underlying distinct style of working. Let me exemplify this by fleshing out this statement.

First, consider the position of a chemist who does research in the field of a certain compound. He is aware that only the most recent publications are of value to him, that each of them contains only a few pages and that there is a precise, internationally agreed indexing method. Due to the existence of proper electronic services he is able to identify the information quickly and to order the relevant copies. He gains dense and punctual information, probably without any redundance.

Secondly, imagine a folklorist engaged in the development of customs and traditions of, say, East Frisia. No matter when published and where and in what language, all publications but also unpublished reports are of interest, items directly linked to the subject or just with indirect relationship. Most of the substantial information are print publications; and in this respect things will not change during the next decade. The community of researchers in this field is too limited and the topic is too nation-bound to afford effective electronic services or to convert existing information. Notwithstanding the researcher has to read and to compare the disparate material - mostly printed or recorded as a photography - in order to identify the relevant information he or she has been searching for.

Admittedly, these are two extreme examples. But extreme examples always help to concentrate the mind on the crux of a problem, in this case help to illustrate the complexity of the contemporary information environment. After juxtaposing both examples, I conclude that in analyzing the respective situation, it is necessary to differentiate very carefully. In the foreseeable future, we will have both, mainly paper-based and electronic-based research - each of them as a method of its own validity. As a result, library services ought to be traditional as well as digital. More diversification in operation is requested to satisfy the needs of the researchers' community. Librarians have to grapple with a much broader variety of media, tools and methods.

Thesis 2: The Role of Ownership and Physical Possession of Information Media is Declining

Electronic media offer absolutely new capacities, which mainly focus on very high storage, disembodiment of the media, change in the kind of providing, ubiquitous availability and the floating nature of documents. All these features lead to one most striking effect that a fundamental alteration of paradigm is to be recognized: the shift from physical possession of information and its related data medium to the valid and effective facility of getting access. In the past, it was common in libraries to purchase books depending on a suitable balance of their intrinsic value, half-life, price and expected demand. These assumptions were not even safe to make in the print period. But just in this way, a balance was feasible between the given budget and how to saturate the public's appetite for information as quickly and comprehensively as required. Everyone knows that by no means all books bought by librarians really were used. On the contrary, considerable masses of books got outdated before they had been requested even once. In so doing, librarians in a state of uncertainty, wasted parts of budget and of storage. Since there is no direct relationship between costs and use, and since the probable use is very difficult to prognosticate, the possibility to increase effectivity is quite limited.

Up to now the importance of a library has been defined by the quantity and quality of holdings. The more comprehensive the holdings are in quantity and quality the higher the rank. As a result, old libraries are particularly highly reputed because it has proven exceedingly difficult to build up large holdings retrospectively. In normal times they were not easily to be surpassed. The librarians' mentalities and attitudes have been imprinted by assumptions like these for centuries.

In the digital age things are different in several respects. The bare knowledge of what kind of information is available where suffices to satisfy a client. To carry out this job in a quick and proper manner, that is our task now. To be in full command of the information landscape is the secret of success and nothing else. It is not important to possess the information and the data carrier itself any longer. To meet the needs of the customers just in time - that is a question of qualified personnel regardless of the source the demanded information comes from, because the transmission takes only seconds or minutes. In other words, concerning the digital media, a good library of the future depends only on the quality of its service. To be vibrant with activity is to be considered a more viable remedy than to rely only on ownership of information.

The cost issue constitutes another problem. At least in the case of net publications and in terms of the prevailing pay-as-you-go-scheme the costs connected with a distinct operation are fixed and steady in relation to the usage itself. Consequently, librarians find themselves tempted to share fees and other costs with the customers. The decision what kind of information should be better purchased and what kind should be only available on a basis of intermediation is more or less a result of economic calculation. At any rate, we cannot afford the overall costs, we cannot keep up with the information spiral free of charge to the customer.

Library organization is the next theme to which I would like to draw your attention. Traditionally, we are used to the classical tasks of acquisition, cataloguing and user services, which form appropriate departments, with a lot of variations of course. These divisions are not suitable for the electronic media. To find out the channel where a required information is available means to record the path to it and how to find it again; nothing else than a sort of cataloguing. Reading an information often means buying it; the mere inquiry might put us under an obligation. The patron who wants an information does induce the full service and the process of sale and purchase. Not only the sequence of operations will change; they will take place in quite different contexts and combinations. There are no perfect and all-embracing solutions in sight. But half of the solution is to see the situation as problematic.

Thesis 3: A Sound Balance of Competition and Co-operation is Needed

Since the publication chain has been broken, room for new cooperation and partnership is bound to grow and, in turn, competition will increase. Librarians are forced to reorientate themselves to avoid risking their profession. If libraries do not do their job, our customers will find someone else who can. There is a lot at stake, and therefore powerful players are attracted.

First of all, the group of authors is to be mentioned. Discontented with their publishing houses, mathematicians, physicists, chemists and information scientists are willing to take their own fate into their own hands. Given the long time they have been waiting for publication or given the very expensive journals they are annoyed about, they feel in the position to help themselves; especially because they know the information instruments very well in detail and in depth. It is also fair to say that in the past fate has not exactly smiled upon authors in the fields of science and engineering who wanted to use libraries. Thus they often radically deny the fruitful and useful role of libraries. In this scenario, authors are not competitors but more: they bypass all links of the publication chain and work to regain control of their destiny.

While authors think of how to get rid of publishing houses and libraries in order to leave the market entirely, librarians - not accustomed to be competitors on a service market - have to face just this fact as an absolutely new significant one. Our minds must be geared to selling information and to shaping user-oriented, user-friendly and at the same time economic services. The scenery will change in the near future and various new information agents will be on the market. Particularly publishing and software houses might be counted among them, but also the group of intermediaries and information brokers, not to mention new professions which cannot be specified because they are unknown in detail.

At any rate, every library is likely to loose its local advantage, which binds customers to libraries merely because of being around. Libraries without walls are open 24 hours a day and the physical distance does not play an essential role any longer. The convincing success of libraries with an effective service like the Boston Spa Library has been even in paper-based times a strong and valid proof for this theoretical consideration. The better and more attractive service will substantially influence the decision of the client, what library he or she is going to use. Any shortage, however, will jeopardize the traditional link between library and customer. If libraries are not alert of these constitutional facts, in a figurative sense some of their traditional and beautiful buildings might collapse like a house of cards.

As important as competition will be in the future the contrary is also gravely to be considered: widespread cooperation. Collaboration between different libraries, collaboration between publishing houses and libraries, between faculties and libraries etc. Librarians do know the word 'cooperation' very well, especially in Germany. Nevertheless, cooperation in the future will not be the same as in the past. It is reaching the point, of resembling more and more a joint venture. To mention two fields: First, it belongs to the past that librarians could design cataloguing and indexing rules without firm contact to their customers. They will fail if their information tools will not be accepted by their clientele in time. Secondly, because they are not able to rely on their own material - the material is disembodied and not at disposal free of charge - they have to rely on the service of another participant of the information market. This could be another library, but also a publishing house or a host. The relationship is going to be as close as between supplier and manufacturer and it never ends if you want to have a specific information on offer for a long period.

Reliability under those circumstances, however, is only guaranteed if there is a clear restriction to a specific field of activity. To put it in other words: The result of widespread cooperation certainly will lead to narrowing and specializing of services in a distinct library. I think all factors which are hampering proper change should be eliminated piece by piece. I am sure these kinds of efforts will bear fruits very soon and the result of a safe network could be obtained.

Promotion Measures

Facing this bundle of problems, the DFG is willing to be active in these fields by promoting relevant studies and by supporting worthwhile projects including experiments. The new programme aims at integrating electronic publications into currently available information resources for academic and applied research. It relies on the recommendations given in the position paper and mainly intends to promote the development, implementation and testing of new organizational and structural procedures. They are to attain the supraregional availability and use of digital publications.

Main aspects to be considered in this context are:

1. provision and supply of electronic media (without acquisition costs);
2. development and enhancement of reference and indexing tools for specific media and subjects;
3. norms and standards for the documentation and retrieval of electronic publications;
4. navigational procedures;
5. integration of electronic publications into the range of currently available information resources;
6. methods for the production and provision of university publications (especially dissertations) in digitised form;
7. digitisation of literature and other information materials;
8. long-term availability of electronic media (including archival purposes);
9. demand analysis and implementation of information services for specific fields of study.

We are thrilled whether or not, or to what extent libraries will derive benefit from the opportunities offered. Many librarians are terrified by the obvious changes and regard their future as a gloomy outlook. But from a different point of view, libraries presently do not act only as information suppliers; they are moving in the centre of the research interests of information scientists alike. A period of this kind might be the most exciting one in library history since centuries. We should be aware all the time that the future of libraries is not yet determined. Therefore we have to do the best we can to shape our own future by ourselves unless we risk to be shaped by it.

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New Horizons : Redefining the Equator

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Jenny Walker is project manager for LION development project, system architect, and co-ordinator of LION applications for Europe and North America. Before joining MDIS she worked as director (library operations) for Geac Computers Ltd. and Director of European Operations, CLSI Ltd. Her experience to date in the library automation sector has covered support, sales, and development. In her current role she has built on her international experience and brought this to bear in designing PRO-IV LION to meet global demands.

Martin Fisk is a principal consultant, system architect and library domain expert. He has implemented a number of systems, including a large URICA installation at the Natural History Museum (London). He previously worked for SLS Ltd., coordinating their Shared (networked) System, undertaking design work for LIBERTAS, and specifying bespoke project work and data conversions. Martin Fisk is also active professionally and has been a committee member of the MARC Users' Group, and past chair of the CUMAC (URICA) Library Users' Group. Since working on PRO-IV LION, he has greatly extended his professional knowledge through exposure to and absorption of a range of data formats, local requirements, and cultural differences encountered through attention to the global market.

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Abstract

In this paper, the authors will demonstrate that library automation has reached a critical point in development. The majority of today's available systems have been developed in response to "preservation" based requirements. While superficial attempts have been made to modify systems to address the needs of "access", the library world itself has begun to undergo a paradigm shift which will have far-reaching and fundamental implications for all players in the library scene.

Library systems suppliers must now respond to this shift - the beginnings of a movement by suppliers away from their traditional view and role is now just apparent. The authors discuss some of the enabling technologies and enabling standards, which will now allow the development of systems which will truly address a global market. They focus on the needs of systems to provide access to information in whatever form, however or wherever stored, in whatever its coding.

While touching on general developments in library systems, the authors will explain how MDIS have taken up and are responding to the challenge of creating a new generation system for the global market.

Introduction

When Gutenberg developed his press in the fifteenth century, the timing was such that it not only generated the first "information explosion", but also coincided with the age of exploration. The known world was just beginning to be expanded - not just geographically as the navigators spread through the oceans, but philosophically as the spread of printing spawned a new age of ideas. Man's knowledge of his world was limited by horizons that were beginning to recede - but there was a "World's end", in some cases the belief was that this was a literal edge, beyond which lay oblivion.

Historians have subsequently written about the development of ideas, the spread of literacy, and succeeding information explosions, up to and including the period since the last war, which allowed the development of the computer.

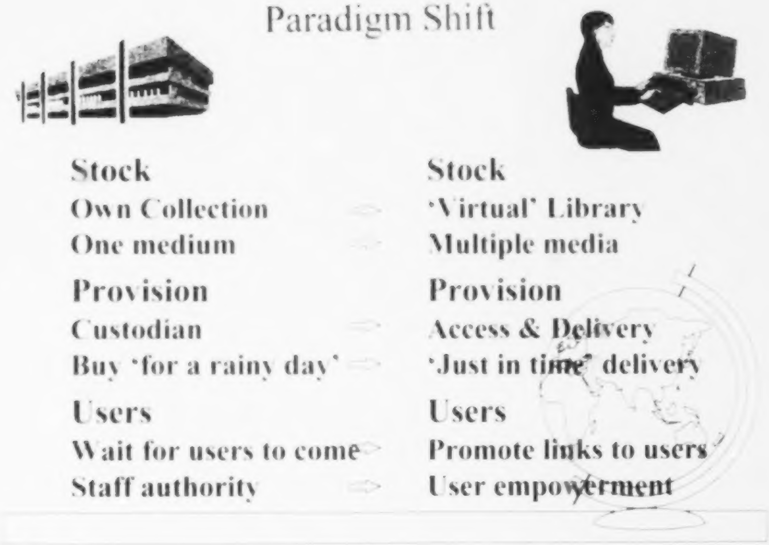
We do not intend to chart the history and development of computers and their application to libraries, but it must be accepted that for today's libraries the computer is second only to the printing press in historical importance, and we are now beginning to see the historical legacy fall away - to be replaced by values imposed by the real world - cost-effective information, delivered at the right time and in the right way.

With the dawning of the information age we see value increasingly being conferred on information whether this be for corporate gain or private recreation. This gives rise to a new range of demands for online information. Technology is key in providing access to this information which, now that the technological barriers and costs are falling, is changing the traditional "hierarchical" communication, where information is collected and disseminated from a central source.

Systems have developed to support the traditional view and have been designed on the basis of the older model of how a library operates - very often this reflects a sixties approach to a departmentalised library by the construction of "modules", which interrelate to a greater or lesser extent. Although the computer has been the tool of the library, the librarians have not always been able to modify the tool to their own requirement, partly because of lack of expertise and experience, as in any new hybrid technology, but also as a result of the systems suppliers' unwillingness to develop innovative solutions to libraries' problems.

Constraints on the suppliers have included the requirements of the various library standards in use, and these have often been cited as reasons for lack of progress, rather than welcomed as means to produce systems that customers can use; the lack of adequate international standards for general machine communication; the costs of hardware and storage; the diversity of applications within libraries; and the problems of user interface.

What has now become apparent is a "paradigm shift" within libraries. Not essentially a change of attitude occasioned by the libraries themselves from within, but rather a response to the pressures and opportunities seen outside of that environment.



Paradigm Shift

Stock		**Stock**
Own Collection	⇨	**'Virtual' Library**
One medium	⇨	**Multiple media**
Provision		**Provision**
Custodian	⇨	**Access & Delivery**
Buy 'for a rainy day'	⇨	**'Just in time' delivery**
Users		**Users**
Wait for users to come	⇨	**Promote links to users**
Staff authority	⇨	**User empowerment**

We can concentrate on three broad areas: Stock, Services, and Users

Stock

Traditionally, and we are drawing broad brushstrokes here, libraries were concerned principally with their own collections. Effort was directed at building and exploiting the in-house collection, with occasional help from outside through various forms of interlibrary loan; but there were very few examples of successful co-operative acquisitions ventures, for instance. There was very much the view "I must have that for the collection". Librarians, too, concentrated on paper-based collections. Even when there was an early move to "media", this often took the form of a paper surrogate, such as microform. The introduction of online information services, such as Dialog, seemed to take a long time, and then the services were often seen as a privilege for some users, provided by the library, but not widely advertised, for fear of use?

Following a mix of good, and bad, experiences, with microforms, audio and video machines, terminals, modems, and now workstations, librarians are able to contemplate a future where their library is becoming "wired", and that they have tools which will help their staff and their users. Networked systems today give rise to the concept of "virtual" systems, where it no longer matters where items are, and therefore it begins to matter less who owns them. Budgets may be allocated to information provision, rather than paper accumulation.

Services

In terms of stock and services, librarians were very much the custodians of their collections and had a responsibility to preserve those collections - very often a requirement was there to answer the "trustees" for the state of the collection. There was a clear division between what was publicly accessible, and what was not; closed access libraries are no longer the norm that they were, and the vision of the library as portrayed by Umberto Eco in "The name of the rose" is fortunately now some way from reality. We are now seeing the move to "access and delivery" increasingly heightened, as standard interfaces such as Z39.50/SR and World Wide Web browsers allow unprecedented access to ever extending resources. Libraries are now becoming caught in a race to supply their services, and compete against themselves for business.

There has also been a shift in emphasis in collection building: where it was possible to buy "for a rainy day", developing collections that were thought to be fitting to the institution or to an individual, it is now evident that libraries cannot hope to collect everything, and allocate the necessary resources to control it and make it accessible: they must instead play a much more reactive role, to provide information as it is required, to provide it "just in time", rather than "just in case".

Users

The changes in global information accessibility have not least changed the way in which users perceive libraries. As we have seen above, changes in stock and services have been driven by the need to respond to users, and users have responded to changes in the world by demanding developments in libraries, whether this has simply been to access the physical item, or to communicate through browsers. The library can no longer wait and hope for users to come, but must reach out and promote itself and take the services to the user.

It must also accept the empowerment of the user: the days are past when the librarian was expected to be the fount of all wisdom, and the concepts of user education and general self-help for users are now critical for the smooth operation of many libraries. The tools are becoming available for the user to perform many of the traditional roles of the librarian, and some which go beyond that tradition. For instance the development of the UnCover service allows the individual to bypass his library service - and indeed that library may not be able to offer anything equivalent - but should it not?

These changes have in fact been evident over the past 20-30 years, but have now gathered momentum and are moving apace, fuelled by library automation systems and the emergence of robust communications networks and the development of new standards such as Z39.50/SR. There has also been a corresponding growth in discussions between libraries, and industry, on the way forward. The European Community, in the activities of DG XIII, has been a significant catalyst in such developments, but the overall growth of library networks such as OCLC, PICA, and the German cooperative systems has meant that some degree of market push has been associated with the customer pull. Libraries now are short of money, short of space, and are looking to systems to support their day-to-day running and to take them into the service-oriented arena. These systems must be appropriate to the task.

Library systems have evolved from humble beginnings to a point where they are significant tools not just for the handling of simple transactions, but also for the running of complex organisations. However, although the early systems have developed, they are now exhibiting obsolescence: they reflect back to the organisational environments from which they were developed and, now, just as some manual systems had to be left behind, some systems need to be left behind. Organic growth is not always appropriate - fundamental breaks occur where the door opens to a new generation. Library systems have attempted to adapt in a harsh "adapt or die" environment; but superficial adaptation doesn't make a new generation system any more than putting a terminal in a library makes for a digital library.

Access and delivery are vital to meeting the needs of information requesters, and today armed with enabling technology such as the Internet and standards such as Z39.50 and EDI for bibliographic information, and PDF for full text documents, we can become global players in the information world. But as we reach out beyond the next horizon only then do we see the next (as any reluctant mountain climber knows only too well). To deal with just a few of the issues we now face:

Data Formats

The greatest achievement of librarians to further the cause of information technology can also be seen, rather like religion, as the greatest cause for dissent and controversy and recrimination. The development of machine-readable cataloguing has enabled the library world to create (and recreate) the records of what must now be billions of bibliographic records. But we have never fully agreed on one format - indeed we have spent considerable effort ensuring differences in format, whether for reasons of nationalism (CATMARC - from Catalonia, separate from IBERMARC as used in the rest of Spain), character set (CNMARC - from China), or cultural heritage (MAB - in Germany). And we have gone even further by continually revising these formats, causing problems for libraries and suppliers alike.

To a certain extent this was fair game, as the reach for the record was limited - indeed it was absolutely limited to printed output in the first decades of its existence. But then the idea of the OPAC came about, and suddenly the suppliers had to provide formats for unskilled use, and deal with new concepts, such as "interface". The growth of networking again caused competition amongst vendors to build the best proprietary OPAC, but there remained the problem of acquiring the records - in fact the problem began to grow acute as libraries, particularly the scholarly libraries with large collections and a tradition of excellence in their recording, could see that records could be obtained across the Internet, but were often tantalisingly available in different formats. The majority of systems are bound to a specific format, and until the release of the UseMARCON converter, such records will have to be either custom converted or transcribed - both expensive options.

Character Sets

All records have their own character set, either bound in to the particular format, or added by some local variant. This has caused another layer of potential problems, for, having converted the data from the original format to your own, you then discover that the record contains all sorts of odd data - and may even fail to convert - because it contains "special" characters. There are far more character sets in use in the world than even bibliographic formats, but here at least there is a solution, provided by the Unicode standard. This will allow encoding of 65,000 characters, and should solve the problems of the majority of libraries, although not the demands of the Taiwanese phone-book, which requires an additional 70,000 characters for the handling of unique name symbols. For this we will have to wait for the full implementation of ISO 10646, which will allocate four bytes for each character representation.

Of course Unicode will cause further problems before we can truly declare it to be a Holy Grail. Unix systems cannot handle it, and an intermediate form has to be used; there are questions about additional space requirements, and worries about the need to recover previously encoded data. All of these problems have solutions, however, and the benefits that may be reaped from the growth of Unicode applications, not just in libraries, will be apparent in the coming global information market. In passing, we should state that our company, MDIS is providing the technical resource for the CHASE project, a project to investigate the feasibility of Unicode in relation to intermediate data conversion between four European national libraries.

Users

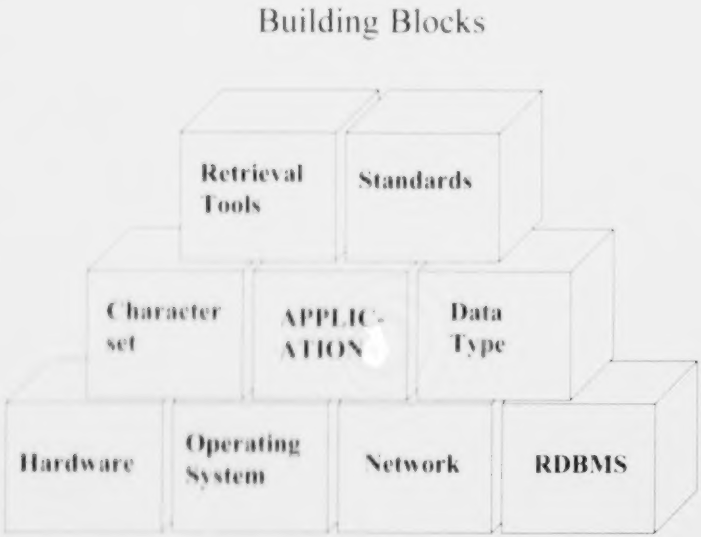
The heading of "Users" appears again, because we must not lose sight of what we are actually trying to achieve, and we still have a long way to go in satisfying two distinct needs: the question of the user interface; and from the management view, how do we provide for so many users without more sophisticated charging mechanisms?

Let us take these in turn. The question of the user interface still causes perhaps the greatest anguish in suppliers, library administrators and users. We are now able to approach standards of quality which were not even dreamt of but a short couple of years ago. The rise of Windows and the widespread development of GUI applications has caused a demand for the application of GUI to library systems and particularly to OPAC. However, it is not sufficient to "repaint" an existing application with a GUI front-end; much thought needs to be applied to the structure underlying the interface, and how links are provided. Can the interface, for instance, truly handle audio and video applications? Can it be used to provide a common interface to an imaging system? Can it utilise the network possibilities that are now available? We mentioned the issue of character sets above: how does the system address the needs for interface languages tailored to the individual - in language, script, and terminology?

With greater economic pressure on libraries, another debate has begun - should libraries charge for access to information. This again can be an emotional argument, and we will not take a position on either side; but would simply say that in today's world anything may be chargeable, and systems must not only allow that charge to be levied, but must also feed back information to the managers, to ensure that charging is at the right level, and that services are maintained - neither under-exploited, through too heavy charges, nor overwhelmingly used, to the potential detriment of other services, by the lack of financial or other controls.

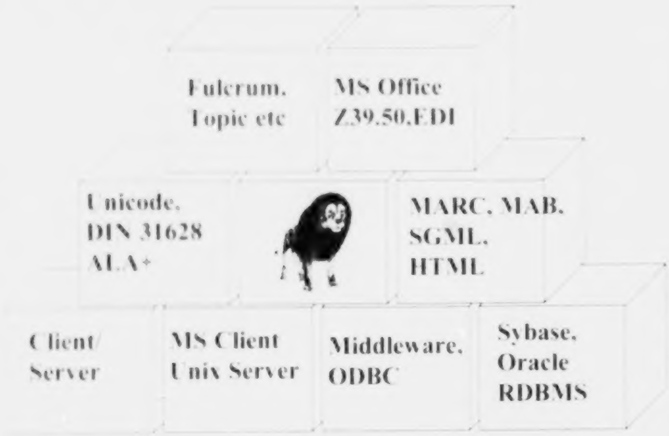
LION

Our company, MDIS, has embarked on an ambitious development, to design, from the ground up, a new system to address the questions we have raised above. LION is based on a series of building blocks, which we see as the fundamentals of a modern system. These elements may be represented so:



LION has been designed to be as open as possible, to allow it to address the global market, and all the variations that may be found within it, and a keynote for any of the building blocks in use within LION is that LION must offer independence and openness, and so any products named in the next figure are for illustration:

LION Building Blocks



In our design we have avoided attempting to write a system for one specific user, and have even looked beyond our company's existing users. We have spoken to library directors and senior management in selected significant libraries throughout the world, and concentrated on the needs of information strategy. LION looks forward to the integration of a large range of functions within a library context, and while underpinning the system with rich functionality, LION will enable integration of resources, within the library, and external to the institution. It will provide for the seamless integration of all forms of networked service, in whatever format. And by format, we include both the term in its bibliographic sense - to include data types of any structure - and in the physical sense - to allow access and integration of other media. Utilising increased network capability, the relevant data repositories do not need to be local, but may reside anywhere - a fundamental of the virtual library.

LION will provide interface possibilities that may be tailored to the individual, to an unprecedented degree, and will provide facilities for all users from children and pensioners to academics, with special requirements. It will also support the library administration by providing frameworks for the greater control of the institution's work through detailed reporting, but, more importantly, will not impose its own working structure on the library, but instead provide facilities for library managers to identify appropriate workflows for specific activities, and mould the system accordingly.

In our opening we made reference to the age of exploration, and we now recall that in the world of information. The network is now daily discovering new "sites" as libraries, databases, and other information sources are added to it. But we each and all know many such resources that together make up a virtual "dark continent". Physically, the equator marks the halfway point around the globe, but in the metaphysical world of global information, as we push back the horizon, where is the equivalent halfway point? Have we crossed it, or is it yet to be seen beyond the receding horizon? Information systems point the way, they must support the move to ease of access - but let us not be in awe of these systems - they are not to be preserved in their own right, but must evolve or die!

Chadwyck-Healey - Electronic Resources for the Virtual Library : A Publisher's Perspective of Preservation and Access

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Abstract

Chadwyck-Healey is one of Europe's leading publishers of CD-ROM and microform. This article attempts to describe Chadwyck-Healey's function in improving access to scholarly texts for today's research and in preserving scholarly texts for researchers in the future. First of all, the article will highlight examples of electronic and traditional preservation and to illustrate the dilemma faced by a commercial publisher in deciding which format to use.

1. Chadwyck-Healey

Chadwyck-Healey was formed in 1973 by Sir Charles Chadwyck-Healey. It has offices in France, Spain and the United States of America and two offices in the United Kingdom with the headquarters in Cambridge. Today, it employs nearly 200 staff around the world.

Although Chadwyck-Healey is now best known as a CD-ROM publisher, its' first title was a reprint of the General Index to the Reports from Committees of the House of Commons 1715-1801, long out of print for research libraries.

Chadwyck-Healey is renowned a publisher of high quality titles for research and reference in all fields of the humanities and social sciences. It has been publishing on CD-ROM since the late 1980's and was one of the first professional CD-ROM publishers in Europe. Today, Chadwyck-Healey publishes or distributes exclusively over 80 different CD-ROM databases and is one of the largest specialist CD-ROM publishers in Europe.

2. Preservation and Access

2.1 Microfiche and Microfilm

There are several common factors linking Chadwyck-Healey titles; their size and the ambitious nature of the projects. Some of the earliest titles are still considered ambitious, even by today's standards. At the time, microfiche and microfilm were (and in many cases still are) considered to be the most suitable way of preserving for the future books and documents.

The back catalogue of Chadwyck-Healey microform collection numbers over 400 titles. These are a few examples of collections of books and documents which Chadwyck-Healey are preserving on microfiche or microfilm.

2.1.1 House of Commons Parliamentary Papers 1801-1995

One of the earliest microfiche projects was to refilm every Parliamentary Paper from the British House of Commons from 1801 to the present thus reproducing the original volumes of Parliamentary Papers which hitherto was found in only a small number of libraries. The period 1801-1994 is now complete and is updated to include current Parliamentary Papers. Over 8 million pages have now been preserved on more than 90,000 microfiche for future researchers with an interest in British politics.

2.1.2 The Nineteenth Century Programme

Another example of our work in preserving scholarly literature for future generations of researchers is the Nineteenth Century Programme. This project is part of a preservation initiative from the British Library. The Nineteenth Century Programme is expected to last 30 years and will reproduce a significant proportion of English-language works first published between 1801 and 1900. The Programme is situated in the Preservation Service of the British Library. It brings together the interests of the librarian and the scholar as well as the Preservation Department of the British Library by reproducing important scholarly works that, in many cases, are in serious danger of deterioration.

Filming began in 1987 and at the end of 1993, the collection contained more than 12,000 separate titles in a number of Special Collections.[1] The table below lists the number of titles available by the end of 1993 in each of the specialist collections within the Nineteenth Century Programme.

Collection	**Number of Titles (to 1993)**
The General Collection: Society and Culture	5,936
Women Writers	1,662
Visual Arts and Architecture	1,457
Linguistics	1,218
Children's Literature	1,085
Publishing and the Booktrade	795
Total	12,153

It is estimated that when the project is complete in the next century that more than 50,000 books from the Nineteenth Century will have been preserved as a result of this programme.

Machine-readable records are created for each title and are stored on the British Library's National Register of Microform Masters and in North America via the Research Libraries Information Network (RLIN). USMARC or UKMARC records are also supplied to libraries subscribing to the collections.

2.1.3 Central Archives of the Soviet Communist Party and Soviet State

This project provides millions of documents selected from the holdings of three key archives of the former Soviet Communist Party and Soviet State.

The State Archive of the Russian Federation (GARF) which was created in October 1991 and formed from the Archive of the October Revolution and the Central Archive of the Russian Soviet Federal Socialist Republic.

The Russian Centre for the Preservation and Study of Documents of Most Recent History (RTsKhIDNI) which was the former Central Party Archive. This was a repository for documents tracing the history of communism as a world movement and prior to 1991 was only accessible to senior members of Communist parties. It is now the repository for all documents issued and received before 1952 by the highest echelons of the Party.

The Centre for the Preservation of Contemporary Documentation (TsKhSD) is the former Archive of the Central Committee of the Communist Party, in effect the highest organ of government in the land, without whose knowledge no ministerial or institutional decision could be made. The archive contains all documents issued and received by the Central Committee and the documents of the Politburo.

An editorial board of distinguished historians has selected records of great interest for researchers. All the material microfilmed has been declassified in accordance with the laws of the Russian Federation.

By the end of 1995, more than 5,000 reels of microfilm will have been published containing over 5.8 million A4 pages of documents and finding aids.

2.2 Electronic Media

2.2.1 Electronic versus Traditional Media

The burning question is at which point should the decision be made for texts to made available in electronic form, such as digitisation, rather than simply creating a microfilm version.

Clearly, there are two standpoints depending on the function of the publisher. If the publisher is a university or other place of scholarly excellence then they will consider the value added to research at that institution by making material available in this way more than they would the project costs. A commercial publisher however, such as Chadwyck-Healey, not only has to consider the scholarly value making of material available in electronic form but also the commercial considerations such as:

- How much will this project cost to complete?
- What is the best way to create the database? By keying or scanning?
- What is the potential market size for the database, in other words how many institutions are there that can take advantage of this new database?
- When can I expect a return on my investment?

An equally important question is whether the market is ready for delivery of material in this form. The level of acceptance varies from country to country and on the level of commitment from central funding bodies to increase the availability of electronic resources in institutions of learning. December 1993 saw the publication of a report by the Joint Council for the Funding of Higher Education[2] on the future of technology in higher education in the United Kingdom with a particular view to libraries. It made significant recommendations for how the British government should seek to support this development. The document is called the "Joint Funding Councils' Libraries Review Group: Report" and was created under the chairmanship of Professor Sir Brian Follett of Warwick University as well as a number of senior academics, librarians as well as publishers. The document is often referred to as The Follett Report.

Among the frames of reference was a study into the possibilities of greater co-operation and capital and resource sharing by identifying future national needs for the development of, for example, library and information resources and to identify ways to meet these needs. The immediate result of The Follett Report was that the Higher Education Funding Council for England (HEFCE) approved these recommendations and made £9 million Pounds Sterling (ca 14 million US Dollars) available so that projects could be implemented straight away.

2.2.2 Resource Sharing

The increasing availability of regional networks has made it possible for institutions to form regional or national purchasing groups or consortia so that they may take advantage of the benefits of volume purchasing. At the same time, databases may be mounted on servers and accessed by licensees within the defined consortia and to have the economies of scale to acquire the technology to offer databases via centrally located servers which are then shared between institutions.

Agreements for databases offered in this way have already taken place in the United States of America as well as in the United Kingdom. In 1995, the Combined Higher Education Software Team (CHEST), part of the Joint Information Systems Committee (JISC) made an agreement with Chadwyck-Healey for national licences to three databases: English Poetry Full-text Database (600-1900), Palmer's Index to The Times 1790-1905 and Periodicals Contents Index, the last of which is to be mounted on a central server located at a university in the United Kingdom and accessed via the Bath Information and Data Services (or BIDS) gateway by any licensee.

2.2.3 Literary Databases

Although this last section may seem to have steered slightly away from the main theme of preservation and access, it does I hope try to justify why Chadwyck-Healey is committing such large resources into the creation of literary texts in electronic form.

By the Spring of 1997, Chadwyck-Healey will have created electronic versions of more than 8,500 texts in all fields of literary study. In many cases, all texts contained within a book will be converted to create the electronic version, including the texts, notes and critical apparatus. This is the case with our first German language collection, Goethes Werke (Weimarer Ausgabe) auf CD-ROM[4]. Not only are all of Goethe's literary writings included, but also all of his scientific writings, diaries, conversations and letters as well as the complete critical apparatus and notes, papalipomena and variants.

In other cases, just the literary texts themselves are included. This is the case of the English Poetry Full-Text Database which contains British poetry in English covering the period 600 to 1900. To build this database, the texts of poems from more than 4,500 volumes were converted into machine-readable form to create the largest full-text database ever published for the humanities.

2.2.4 Creating Literary Databases

It is often assumed that to convert the texts into machine-readable form, Chadwyck-Healey has used OCR devices to scan the texts. This is not the case. In all of our literary titles, every word has been keyed not once but twice by different operators. Then a comparison program highlights any differences between the two versions. Further manual proof-reading eliminates keying errors completely. The condition of the original texts is often extremely poor with a great variety of typestyles and poor print quality. Only double-keying and verification of this kind can ensure a high degree of accuracy.

A coding scheme called SGML (Standard Generalized Mark-up Language ISO 8879) is also used to tag the different structural elements of the database such as the volume, section, paragraph to the level of titles, documents, column numbers, page numbers, epilogues, prologues, introductions, epigraphs, bibliographic information, etc. Each structural element is clearly defined and can be clearly distinguished from the main texts. For example, a Germanist may wish to research references Goethe made to Prague (Prag) in his diaries or letters but not in his literary texts; a Theologian may want to find medieval texts referring to a particular quotation from the Gospel According to Matthew but to exclude footnotes. SGML makes it possible to differentiate the various structural features of a text.

SGML also makes it possible for texts on screen to resemble, if not exactly duplicate, the look of the original printed edition by tagging typographic elements as well as indentations. For example, a word that appears in italics or in larger point size in the printed edition may also be displayed in this way in the SGML-tagged version.

Here is an example of how the opening lines of Goethe's *Faust (Erster Teil)* appear without and with SGML tags.

Without SGML

Zueignung.
[Seite 5]
Ihr naht euch wieder, schwankende Gestalten,
Die früh sich einst dem trüben Blick gezeigt.
Versuch' ich wohl euch dießmal fest zu halten?
Fühl' ich mein Herz noch jenem Wahn geneigt?

With SGML

```
<HEAD R=italgo>Zueignung.
< /HEAD>
<XREF RID=01625401 TYPE=LESARTEN ID=016Q0004> [
Lesarten]
<PB N=5>[Seite 5]
<STANZA COM=5>
<L N=1>Ihr naht euch wieder, schwankende Gestalten, < /L>
<L N=2>Die früh sich einst dem trüben Blick gezeigt. < /L>
<L N=3>Versuch' ich wohl euch dießmal fest zu halten? < /L>
<L N=4>Fuhl' ich mein Herz noch jenem Wahn geneigt?< /L>
```

A scholarly board is appointed to advise us not only what databases should be created but also which editions to include and to suggest how the typical researcher would expect to interrogate the database.

Other literary titles from Chadwyck-Healey include the Patrologia Latina Database, Editions and Adaptations of Shakespeare, English Verse Drama Full-Text Database, English Prose Drama Full-Text Database, The Bible in English, Early English Prose Fiction, Eighteenth Century Fiction, Voltaire Electronique and Corpus des Oeuvres de Philosophie en Langue Française sur CD-ROM.

3. Access to Historical Scholarly Journals

When a researcher is looking for information on recent articles on a particular theme, whether it be philosophy, literature, sociology, etc., he/she has a variety of current content indexes to choose from such as Swets, Inside Information, ISI, Wilson and IBZ. Furthermore, recent developments in electronic document delivery have made it possible for commercial publishers as well as educational institutions to deliver current articles in electronic form on demand. These services include UnCover and JASON/JADE[4]. The quality and quantity of indexing for current scholarly journals is extremely high.

However, what does the researcher do when the need is not for current information but articles written 10, 20, 50, 100 or even 200 years ago. The library may be preserving the journals in their archives but there is no easy way to access them, or more importantly their contents.

3.1 Periodicals Contents index

One of Chadwyck-Healey's most ambitious publishing projects is Periodicals Contents Index (PCI). It provides article-level access to more than 3,500 scholarly journals in the humanities and social sciences from their beginnings, in many cases during the nineteenth century, up to 1990. PCI makes it possible to search back volumes of journals with the same ease and convenience as searching the latest issues. With PCI, libraries can make available to researchers back volumes of journals which might otherwise remain unused in some archive or journal store.

It is published in two chronological Series, the first of which covers the period up to 1960 and Series Two which updates journals included in Series One and adds titles published after 1961 and up to 1990. So far, six discs of PCI have been published containing more than 4.3 million article records between them. It is estimated that when PCI is complete in 1998 it will comprise of 18-20 CD-ROMs and in the region of 14 million article records.

4. The Future

As a publisher, Chadwyck-Healey is always aware of the continuing need to improve the methods of delivering information to customers. Already CD-ROM servers are being discarded in favour of large hard-disc based systems where the data is captured on to hard-disc and offers the benefits of faster search and access times to databases. Pre-caching of databases has become a fact of life for many institutions.

Moreover, an increasing number of institutions have the facility to network not only between buildings and across campuses, but also within a metropolitan area or even between cities. To this end, Chadwyck-Healey will be developing client/server versions of many of its titles to facilitate multi-site networking.

To this end, the first client/server titled to be published by Chadwyck-Healey is the Periodicals Contents Index which will be available from May 1996. The library will be able to choose whether to acquire a client/server version for use on their own networks or to access PCI via Chadwyck-Healey's own server. Client/server versions of the literary databases will also follow later in 1996.

The rapid progress and expansion of technology in higher education means that research establishments can access scholarly literature of a historical nature in completely new and hitherto only dreamed of ways.

References

1. The Nineteenth Century Progress Report 1986-1993, Chadwyck-Healey 1994.
2. Joint Funding Councils Libraries Review Group: *Report*. Bristol, Higher Education Funding Councils' for England, 1993.
3. Goethes Werke (Weimarer Ausgabe) auf CD-ROM is published by Chadwyck-Healey in conjunction with Hermann Böhlaus & Nachfolger and dtv München.
4. JASON / JADE is an electronic document delivery service from the German state of North Rhine-Westphalia and is a joint venture between the institutions of higher education within that state.

National Self-Sufficiency in an Electronic Age

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Maurice B. Line is a consultant in the library and information sector, specializing in staff development and the management of change. He retired in 1988 as Director General Science Technology and Industry in the British Library, which he served for 15 years. Before that he worked in five university libraries. He is a Professor Associate at Sheffield University, edits two library journals, and is on the Board of Directors of Engineering Information, Inc. He has two honorary doctorates and is a Companion of the Institute of Management. He was President of the Library Association in 1990, and was awarded the medal of IFLA in the same year. Maurice B. Line has written on a wide variety of topics.

Abstract

Developed countries have in the past aimed to have within their libraries as a whole as comprehensive a national collection as possible, on the grounds that this is necessary if local users are to have adequate access. The overcoming of national boundaries by electronic technology calls into question the desirability of or necessity for comprehensive national collections. Online access to catalogues of foreign libraries is becoming widespread, and so is the transmission of short documents by telefacsimile. Direct access to electronic files, possibly held by commercial institutions, is unlikely to lead to further significant changes in the relative cost-benefit of national and international access. How-

ever, international access is better in speed, reliability and cost for copiable items such as periodical articles than for books, and for material in the sciences than in the humanities; national holdings ought therefore to be more comprehensive for books and for the humanities. Strong national collections depend largely on good local collections. Unfortunately, in academic libraries books have tended to be sacrificed to periodicals and the humanities to science, so that national provision for them is worse. Even for periodicals and the sciences, there are strong reasons of principle and practice, among them the cost of access, why readers need good local holdings. For better provision both locally and nationally, local libraries need to spend more on the humanities and on books, preferably by an increase in their budgets, but if not by transferring money from science and periodicals.

THE HOLY GRAIL OF NATIONAL SELF-SUFFICIENCY

There used to be a feeling that every library had to aim at a high level of self-sufficiency. That aim has long been abandoned, but in its place there has arisen a belief, implicit or explicit, that every developed country should aim at a high degree of self-sufficiency in literature provision. One holy grail has been succeeded by another. This was natural, since if (or rather, when) local collections became less and less sufficient it was reasonable to turn to the national system. The questions that have been debated have been not whether it should be self-sufficient but what the right level of self-sufficiency should be and how to ensure that it is attained. The main models of provision have been

- a comprehensive central collection (like the British Library Document Supply Centre)
- planned concentration of collection on a few large libraries
- planned distribution among numerous libraries
- unplanned reliance on all libraries included in union catalogues[1].

The first, a comprehensive central collection, has now been ruled out everywhere on the grounds that the cost of building up such a collection is too high and that automation has made it unnecessary by making the contents of the nation's libraries accessible. The second reason applies only in countries where there is a very large number of large libraries. There may now be a third reason against such central collections, that the dramatic developments in electronic technology have made international access achievable and are thus making national self-sufficiency unnecessary - the main topic of this paper. I should tell you at this point that the paper is specially concerned with European libraries, although I believe that many of the points I shall make apply to most developed countries.

Some countries, among them Germany[2] (as an official policy) and the Netherlands (unofficially), have combined models (b) and (c) - concentration on a few libraries and distribution among many - by focusing supply and demand on a few select libraries, but also using the resources of other libraries. It is significant that while demand in science and technology in the Netherlands can be met largely from three libraries, demands in the humanities and social sciences require use of a much larger number of libraries. A similar policy is being followed in Australia, where the useful term Distributed National Collection seems to have originated[3,4].

The fourth model, in which no effort at all is made to plan collecting at a national level, is the most common. It works well in the USA, because there is a very large number of large libraries, which between them provide comprehensive coverage of the world's literature without any need for planning. It is true that there are several planned cooperative acquisition schemes in the USA, but these are all local and regional, and aim merely to extend the resources of libraries in a certain area. The USA is in a uniquely favourable position, and it is doubtful if unplanned provision works nearly as well anywhere else.

Cooperative acquisition schemes

The second and third models above involve usually some kind of cooperative acquisition scheme. This is the most common of the various planned means of pursuing the grail of national self-sufficiency, a pursuit that has led to as many adventures as King Arthur's knights experienced, and with comparable success (you recall that only one knight saw the grail at all, and that was only a glimpse). One of the first and most ambitious attempts of all, the Farmington Plan in the USA, faded out largely because, when funds began to run short and libraries had difficulty in buying all they needed to serve their own clients, they became unwilling to acquire materials that a user in another library might need some time[5]. The Scandia Plan in the Nordic countries, which was even more ambitious since it involved several countries, achieved almost nothing at the cost of much money, time and effort before it was finally abandoned[6]. Attempts in Sweden to allocate subjects among academic libraries ran into logistic problems, came up against the unwillingness of libraries to accept the subject areas suggested for them, and in any case had no extra funds to dispense.

National acquisition schemes work best when they use the strengths that libraries already possess, as in the Netherlands, where specialized libraries such as those in agriculture and technology can offer a national service without extending their coverage of items; they may not be acquiring enough materials for some purposes, but their *areas* of coverage do not need to be enlarged. Coordination may be desirable (see Tornudd[7] for an account of the arrangements in Finland), but coordination is not the same as planning. The real issue in most developed countries is not whether to plan a national acquisitions scheme but whether the total acquisitions in the country are sufficient. (For a thorough though now rather outdated review of the subject of national acquisition policies and systems, see Collins & Finer[8]).

It is in fact questionable if cooperative acquisition schemes do, or can do, anything significant that cannot be, and is not, achieved without them. It can be assumed that all necessary core materials are present in the country, because individual libraries will have acquired them; and there will also be without any planning at all a very large number of additional items as local libraries pursue their own interests (and, one hopes, those of their readers). They will undoubtedly acquire between them many duplicates, but most of these will be needed on the spot. The extent of "unnecessary" duplication may be quite small, and its cost may be less than that required to avoid it. By "unnecessary" I mean materials that do not really need to be on the spot, as opposed to items that do, such as student textbooks and heavily used periodicals. There have been a number of overlap studies (recently reviewed by Medina[9]), but very few of them shed any light on the extent of "unnecessary" overlap. One that does shed a little is a study carried out in the UK over 20 years ago, which showed that in a group of 18 research libraries the rate of duplication of foreign-language books - most of which would be little used, since the British do not read much that is not in English - was only 1.7 copies per title[10].

A key question with regard to national provision is *whether local library acquisition funds are large enough to ensure that between them they make up a substantial national collection*. The question may be important, because they have been savagely depleted in recent years in many countries. But it is important in national terms if, and only if, it is more cost-effective to have a national collection than to rely on international access.

Another key question is *what materials are needed to satisfy national needs*. This is a very difficult question, since many needs are not expressed as demands; demand is very much a function of bibliographic exposure and supply, and better supply leads to an increase in demand. But the question still has to be asked. The German plan seems to be much the most successful in ensuring extensive acquisition of materials in the country, but how many of these are actually needed? Much effort and money can be put into schemes that result in the accumulation of a lot of material that is never used.

It is possible to set targets for national self-sufficiency. These might be set as the ability to meet 70%, 80% or 90% of demands of users nationally. But what do these targets mean? Why not 50% or 95%? And should "demands" be actual or potential? As mentioned just now, demand is not a constant.

TO ACQUIRE NATIONALLY OR NOT?

The decision whether to acquire nationally - or rather, to try to ensure that libraries between them have enough money to create a good national collection - should ideally be made on the basis of relative cost-effectiveness of national and international access. The main criteria for effectiveness are **speed of supply**, **reliability** (probability of getting an item from the source approached), and **ease of use**[11].

Speed of supply

The speed of supply for items sent between countries by mail depends largely on three main factors: the efficiency of postal services in the supplying country, the efficiency of supplying libraries, and the efficiency of the postal service in the receiving country. (I have incidentally long been puzzled as to what exactly postal systems do to international mail, since the time spent in actual transit for items sent by mail between two countries as remote from one another as the UK and Australia is no more than one day). At present, libraries in countries with well developed library systems and efficient postal services generally supply items to libraries in the same country more quickly than do foreign libraries. In countries with efficient postal services but relatively poor libraries the reverse is generally true.

As a general rule, periodical articles and other "copiable" items are supplied a good deal more speedily than books, even when they are sent by mail; if fax or electronic transmission is used, the difference in speed of supply is greater still. This applies both within and between countries, but since mail between countries is usually slower (in western Europe, by two or three days) than within countries, and since parcels are slower than letters, the differences are increased. Much obviously depends on the efficiency of the supplier, and also on whether the first source approached is able to supply the item. But, other things being equal, in the more developed countries of western Europe the time taken in actual transmission of a book might be three or four days within countries and seven or eight days between them, and for a photocopy of an article respectively one or two and four or five. If the article is sent electronically there need be no difference between supply within and between countries; the differences mentioned in the paragraph immediately above should disappear for copiable items.

If non-European countries are used as sources, supply may be very much slower, depending on the distance of the supplying country and the efficiency of its postal service. Monographs are still often sent by surface mail to save money, but this is misguided economy, as the time taken can add up to weeks or months: few users wish to wait that long, and many cannot. If airmail is used, it will still be slower, but not by nearly so much if the supplying country has an efficient postal system. The fact that some European libraries find it quicker to use OCLC than their own national systems says more about their national systems than about international supply.

A further point is that periodicals are much more likely to be supplied by libraries recorded as holding them than are books, for two reasons. Books may be unavailable because they are on loan when requested, whereas periodicals are often not lent out; and because international loans mean that the books in question are not available (often for a long time) for potential local users, libraries tend to be more reluctant to lend books than supply photocopies of articles. Accordingly, requests for loans may have to go to two or more libraries before they are satisfied, with obvious effects on the speed of supply. There are now good automated systems for the rapid switching of requests between libraries, but delays are bound to occur.

It is clear that international supply is much better for periodicals than for books as far as speed of supply is concerned. Within a few years at most it will be equal to national supply, whereas even with the most superior systems it will always be slower for books. However, if automatic request switching systems become international, the difference will be reduced.

Reliability

The reliability of sources used to be a critical matter, since if the first one approached failed another had to be approached - possibly two or three others. However, with the automated switching systems mentioned in the previous section the fact that the first source approached cannot supply an item is less significant. At present, a higher proportion of requests is met first time within many developed countries than when foreign sources are used, but this difference should diminish; and in any case, the actual fulfilment rate of requests differs very little whether the sources are national or international. As noted, delays may still occur, but the overall system in developed countries is more or less reliable. In any case, problems of reliability occur as much within as between countries; one reason for the heavy international use of the British Library is that it is more reliable than the supply systems of most countries.

Ease of use

A document supply system is easy to use when documents can be located quickly and accurately, when the procedure for requesting is simple, and when payment (if required) is simple to make. Location is becoming easier as more and more library catalogues are accessible online, and easier still as they are combined in union lists so that it is not necessary to search many catalogues. It is simplest and most convenient when a large proportion of wanted documents is available from the same source, or when there is automatic switching of requests between libraries. There has been a general trend towards making procedures simpler in developed countries, but libraries in some countries still demand complex procedures from borrowing libraries (sometimes because of requirements imposed on them by parent institutions or by official regulations). Procedures for obtaining photocopies are usually easier than those for borrowing books, particularly internationally, partly because books have to be returned and tighter control may therefore be imposed.

At present national access has a definite advantage over international access so far as ease of use is concerned. For periodical articles this should dwindle to almost nothing, but it is likely to remain for books from many countries, even if it is gradually reduced.

Costs

One very big problem with the use of relative cost-effectiveness as a criterion is that the costs of national and international access are not stable. Indeed, there is no standard cost for *national* access. In more and more countries it is becoming accepted that the marginal (direct) costs of interlibrary supply should be paid for by the requesting library; in very few libraries are supply and demand in balance, and the net suppliers are no longer prepared to carry the cost of satisfying an ever increasing volume of demand. In some countries the cost of supply is partly subsidized (e.g. by excluding the cost of staff), but this is usually a temporary stage on the way to full direct cost recovery. Most libraries make different charges for loans and photocopies, partly because they may be obliged to charge a minimum rate for photocopies to satisfy legal requirements. If the price charged for loans is lower, this does not of course mean that the cost to the requesting library is lower, since loans have to be returned. Prices for periodical articles also vary according to whether mail or fax is used; the latter may be twice as high. Commercial suppliers charge full cost recovery plus a (generally small) profit. Several recent American articles compare the performance of library suppliers with commercial suppliers[12, 13, 14]. No clear advantage in the use of either one or the other emerges from these studies, which show the expected large differences in cost and performance between commercial suppliers. This may change if publishing becomes predominantly electronic and gets entirely into publishers' hands - a prospect discussed later in this paper.

Current charging practice for international supply varies[15, 16]. Nearly all libraries charge for photocopies, sometimes at direct cost excluding staff, sometimes at full direct cost, rarely at full cost (including overheads); this last is the practice of the British Library, which receives over 850,000 requests a year from abroad and could not justify giving the service at a loss.

The difference in cost between supplying an article within a country and outside it is small, and will get less as telecommunications improve and more articles are accessible electronically, but the price charged by libraries may be different for reasons such as those that make it necessary for the British Library to charge more for foreign requests. There is however no special reason why commercial suppliers should discriminate between countries; their charges will reflect their costs.

In most countries libraries do not charge for international loans, largely it seems because "free" loans are a long-established practice. Other reasons are that loans and borrowings are thought to balance out, though this is very rarely true; and that it is often more expensive in time to charge than not to charge. This latter problem may in due course be overcome by the proposed IFLA international loan voucher, but, whether it does or not, few countries are likely to lend material free for long as the volume of international lending continues to increase.

Whatever the situation today, I predict with some confidence that charging of direct non-staff costs will eventually become the norm for national interlibrary supply. I am not however sure whether this will also become the norm for international supply by libraries, or whether they will also include staff costs or even overheads. While this uncertainty remains, it is impossible to make any sensible comparison of costs; certainly such a comparison is impossible for loans at present. At a rough guess, the cost of international supply by libraries using mail may be 50% more than that of national supply. Within the European Union, prices may eventually be equalized to accord with wider EU agreements, but this is not immediately in prospect. Where commercial suppliers are used for periodical articles, the cost could be anything from twice that of library suppliers to the same; if libraries charged full costs, these could actually be higher than those of commercial suppliers, depending on their efficiency. If libraries are seen to be in direct competition with commercial suppliers, there could be pressure for them to charge full costs in order to avoid unfair competition. If the transmission of articles from electronic versions by publishers or hosts becomes the norm, the cost may be higher, for reasons given later.

If there is the prospect of acquiring extra periodicals or books for the country as a whole - or for that matter of cancelling existing subscriptions - ideally the relative costs of acquisition and borrowing or obtaining photocopies should be calculated. There have been several attempts to make such a calculation for local libraries in the case of periodicals:

estimates of the number of times a volume of a periodical has to be used before it is more economic to buy it range from five to ten. These estimates are almost worthless, since the number obviously depends on the price of the periodical. Average prices in the UK in 1994 ranged from £88 for a humanities periodical to £403 for a science periodical[17]. These averages conceal enormous differences in prices of individual titles. In the case of books, the average price in the UK (January-June 1994) of a British academic book ranged from £86.65 in botany to £14.55 in literary texts, and of a US book from $111.34 in surgery to $24.11 in sports and recreation[18]. To the purchase price must be added the costs of selection, acquisition, processing (including and especially cataloguing), and shelf space.

Another major problem in making a cost comparison between acquisition and obtaining a loan or photocopy is that the expected use has to be estimated. We know that many errors are made by individual libraries in the selection of books even when the items in question seem to be certain purchases - that is, the items receive no subsequent use; when there is uncertainty as to future use decisions must be even less accurate[19]. For periodicals it is rather easier, since use studies can provide data for those already acquired, while interlibrary access figures can provide data on those that are not. However, reliable use studies are not easy to carry out, and the comparison is biased, since interlibrary access figures cannot show what use would be made of borrowed or photocopied periodicals if they were present in the library. If it is hard to make an estimate of expected use in an individual library, it is certainly no easier to estimate expected use in a country.

The best that can be done is to give one or two examples (see **Appendix**). Let us say that a book costs £35 to buy, and an additional £15 to process; if storage costs are ignored, the total cost of acquiring it is therefore £50. Let us also assume that charges are made for all loans, that a national interlibrary loan costs in total £10, and that an international loan costs £15. (These are rather lower than the average figures calculated for US libraries, which are $18.62 for the requester and $10.93 for the supplier[20]). The book then becomes more economic for a library to acquire if the expected use is more than five when it is available in the country, and if it is four or more when it has to be obtained from abroad. If no charge is made, the costs will consist of return mail and internal costs - perhaps £5 for national loans, £7 for international loans, in which case the number of uses is a little lower. If charges are made nationally but not internationally it is of course cheaper to obtain the book from abroad - and *vice versa*.

As a second example, let us take a science periodical costing £300, to which may be added £40 in processing and binding (it has 12 issues a year and occupies two bound volumes): £340 in all. Let us also assume that the total cost of obtaining a photocopy of an article is £10 nationally and £12 internationally (these figures ignore bank charges for international transactions - it must be hoped that the IFLA international voucher scheme currently being tested will enable such charges to be largely bypassed.) It is economic for a library to acquire the periodical if use per volume is 35 or more when it is held in the country, 29 or more when it is not. It is not surprising that many authors (e.g. Gossen & Irving[21]) have concluded that it is not cost-effective (or for that matter necessary for other reasons) for individual libraries to continue to acquire low use periodicals.

The above examples relate to individual libraries, not to countries. Thirty-five uses of a periodical are unlikely in an individual library, but they are not at all improbable in a country. However, as the calculations in the Appendix show, it would not be economic to acquire it for the country until total use was as high as 170. It would be economic to acquire the book nationally if there were 10 expected uses.

The periodical example illustrates the very dubious utility - one might say absurdity - of making cost comparisons of this kind. If they were applied strictly and acted upon, there would be few science periodicals left in libraries, and in consequence there would be fewer published. The academic community would, rightly, object strongly to this, for its research would be very seriously affected. In a few libraries the "access rather than holdings" principle has been taken to a logical conclusion, and most of their periodicals have been cancelled. One of the librarians concerned, Widdicombe[22], has written his experience up, and commended the practice as resulting in "more access, not less": because users have no local stock to use they are forced to consult bibliographic databases (or, as he puts it, he has "freed [his] customers"), and this leads them to many more items than they would otherwise have known about. However, it must surely be possible to induce users to consult databases without taking quite such drastic measures. In any case, he admits in discussion that his action is possible only because very few other libraries do the same; if they did the whole strategy would fall apart, since in time there would be few periodicals to access from elsewhere. Similarly, though much less probably, countries could act with short-sighted selfishness.

The dubious nature of comparisons does not however greatly strengthen the case for national (as opposed to local) purchase, since a periodical specially acquired for national purposes would be available in only one library in the country. Very few countries are so small as to make frequent journeys for browsing in libraries in most other towns a realistic prospect. There are nevertheless advantages in very large specialized libraries which hold such extensive collections that researchers may find it worth their while to go there to browse, preferably in an open access collection.

There are in any case too many uncertainties for decisions to be made on the basis of costs alone. The vast differences in the price of individual periodicals and books, and the variable and changing situation with regard to charges for supply, mean that any calculation would not only be extremely complex but would remain valid for only a short time.

THE IMPACT OF FUTURE DEVELOPMENTS IN DOCUMENT PUBLICATION AND ACCESS

Electronic technology has already transformed supply within and between libraries, and within and between countries, by exposing the contents of libraries, in principle worldwide, by aiding requesting and speeding up supply. What effect are further developments likely to have?

In the future there is a real prospect that commercial suppliers will dominate in the provision of journal articles, either because they perform better than libraries or because only they have the text to supply. If they transmitted text electronically, there is no reason why prices should be affected much, if at all, by whether the supplier was in the same country as the requester or not. *Costs* to requesters would however vary according to telecommunication charges. If hard copy was supplied there probably would be some difference not only between national and international prices but between prices charged to different countries, because of different postage rates; suppliers might however decide for the sake of simplicity to charge one standard set of rates.

CD-ROMs are not an ideal vehicle for full text, because their storage capacity, great though it is (and it is still increasing), is still limited, and this means that large numbers are needed where very large quantities of text are concerned. However, it is no harder (in fact, it is much easier) for libraries to store large numbers of CD-ROMs than of books. There are now numerous examples of journals on CD-ROMs in addition to the best known, ADONIS. If enough journals were available in this form, or indeed in any future form of storage medium that was offered for sale, and if they were cheap enough, we might see the trend towards ever-increasing remote supply reversed.

There have been suggestions in the USA and UK (and probably elsewhere) that research papers should be taken out of the hands of journal publishers and made available by the academic and research institutions where they originate, probably online over the Internet, either from individual institutions or from integrated files maintained by a central organization. It is argued that technology now makes it easy to do this, and the crisis of periodical publishing would be thereby solved. Obstacles in the way of such a system are its doubtful acceptability to authors, who like to see their work in print and depend on it for their academic standing; the difficulty of ensuring quality control; the problems of bibliographic control; and the difficulty of managing the system (if it were in the public sector already it would be a prime candidate for privatization). What the costs of access to such a system would be if it ever came into being is unknown; they would almost certainly be a lot lower. As with commercial suppliers, national and international costs would be the same for electronic transmission, but would vary for hard copy.

In the longer term, we may see fundamental changes not only in the way that publications are made available but in the way they are written[23]. Users often want not protracted documents but small items of information, which are hidden in much currently published material. These information nuggets could be made easier to retrieve if they were deliberately identified as such. A scientific work would then be rather differently structured, and would not be intended to read as continuous prose. The kind of book we are familiar with could become almost a thing of the past except for subjects where continuous reasoned argument is necessary. Such a system would be highly amenable to electronic storage and access, but bibliographic control would be a nightmare. In this sort of information universe, interlibrary supply would play a minor role, and browsing in the recognized sense would become impossible. But this is speculative. Printed publications of a more or less conventional kind show every sign of having a long life ahead of them, and planning for the medium term future must take place on this assumption.

OTHER ARGUMENTS FOR NATIONAL SELF-SUFFICIENCY

International stability

There are other arguments for a high degree of national self-sufficiency. One is that heavy dependence on other countries is politically unwise. The stability of other countries cannot always be relied upon; nor can continuing good relations. The interdependence of the states of Eastern Europe in library affairs, and especially their reliance on Russia, has broken down to the extent that they now prefer to use sources in western Europe. This is certainly a point to be taken into account in some parts of the world, but is not a matter for serious concern in western Europe or in Anglo-America, and in any case countries where there was political instability, whether external or internal, would not often have either the inclination or the money to spend much on national collections. Most items wanted in western European nations must be available in libraries in member states of the European Union, and the possibility that the EU will break up into warring states can be discounted for the foreseeable future - if it did there would be other things to worry about than interlibrary supply. The prospect of individual states breaking up is higher - countries such as Belgium, Italy, Spain, and the UK all suffer from internal break-away movements; but this would not affect document supply within Europe, and in fact by eroding the case for national self-sufficiency strengthens the case for a European document provision and supply system. The only type of document that politically unstable countries may be able to supply that cannot be obtained from elsewhere is grey literature, and purchase is not generally a realistic alternative for this, since it is often hard to acquire.

National pride

A further argument for national self-sufficiency is national pride: no developed country, it might be argued, can hold its head very high if it is excessively dependent on other countries. This is an argument that I would accept. It is however very unlikely that most developed countries will be so insufficient in library resources that the demands they make on other countries will be more than a small fraction (perhaps between 1% and 5%)

of those made internally. In any case, a much greater degree of interdependence among all countries is inevitable as information and communications technology makes national boundaries less and less meaningful; some dependence is no more a matter of shame for libraries than for finance and manufacturing.

SUBJECT AND FORMAT DIFFERENCES

There are several relevant differences between periodicals and books. One - that periodicals are usually amenable to copying, while books are usually not - has already been stressed. Most material in the sciences is in periodical form, while the opposite is true of the humanities. Moreover, demand for literature is much more concentrated on a limited range of material in science; this, as well as the fact that most of it is in periodical form, makes demand more predictable than in the humanities. Furthermore, demand for scientific literature is much more similar between different countries than demand for humanities literature, which tends to have much more national and local interest, so that the former is more likely to be available from other countries. All these factors make it desirable for a country to have more extensive collections in the humanities than in the sciences. The social sciences fall somewhere between the sciences and the humanities.

It is well known that the literature of the physical and life sciences as a whole becomes obsolescent more quickly than the humanities or social sciences, though this is an over-simplification; much literature in some sciences, for example chemistry, botany and zoology, obsolesces very slowly, while a good deal of the literature in the social sciences (e.g. in economics) has a short life. Because much material retains its value over a long time, and because access to literature may become more difficult as it gets older, it is more necessary to ensure access in those subjects where longer life is more likely. The safest way of doing this is to see that it is acquired for the country, although since selection is such an uncertain process the chance that an item wanted in the future will have been acquired may not be high.

THE "ACCESS RATHER THAN HOLDINGS" PHILOSOPHY

I would like to say a little more than I have said already about the access versus holdings issue. The modern gospel for library collection policy tells us that we should aim at access rather than holdings. The future library, we are told, is one where the actual stock of material will be small and the great bulk of items wanted by users will be obtained from elsewhere, mostly from electronic stores by electronic means. This trend is inevitable, we are assured, for several reasons. Economic factors will mean smaller budgets in real terms, and thus force us to acquire less and less, so we cannot build up large stocks. Economics will also mean a limit to future building to accommodate materials. Even if budgets were maintained at present levels, the continuing growth of literature would result in our acquiring ever smaller proportions of world output, so that we have to obtain more and more from external sources. In any case, much future publication will be in electronic form only. And it will be much more efficient to obtain material when users want it, rather than building up collections in the prospect of future use - "just in time" rather than "just in case".

I am unconvinced by the inevitability, let alone the desirability, of a positive shift in policy from holdings to access[24]. "Just in time rather than just in case" is a nice catchy phrase, liable to be used in place of a sound argument, or to conceal the absence of one. It was coined for industry, where it often makes a great deal of sense. Efficiency must take into account costs as well as effectiveness, and it is by no means clear that access will be either more effective or cheaper than holdings. In present circumstances, as I said above, if enough libraries adopt such a policy there will be few holdings to access, and as sales fall prices will rise, eventually forcing some publications off the market (and a good thing too, I can hear some say). Since a great deal of material is picked up by browsing, for which exposure is necessary, effectiveness is bound to be harmed by a reduction in exposure; every user must have read much literature that he did not know he wanted until he saw it - there is a lot to be said for "just in case" collections, just as there is with umbrellas (whoever heard of a "just in time" umbrella?). Libraries should be means whereby people can advance the frontiers of knowledge, not, as was once said, "crawl along the frontiers of knowledge on hands and knees with a magnifying glass". And since an electronic publication system is likely to be largely if not wholly in the hands of commercial publishers, so will its costs be; publishers will not willingly make smaller profits, and access could well cost more than holdings. A recent book by Crawford and Gorman[25] deals at length with the unreality and likely costliness of the brave new world of "access only", and some other authors have begun to question it. Is this a case of the Emperor's virtual clothes, or perhaps Virtual Unreality?

It has been suggested that not only is browsing overrated (with which most users simply do not agree), but that it is possible to browse full text on screen (it is, but it is very slow and inefficient), and that browsing abstracts is also effective (it is, and I do it regularly, but it is not a substitute for browsing through original material). Undoubtedly the computer has opened up new ways of scanning and browsing, but it has not produced an alternative to traditional browsing - any more than mail order catalogues have killed off window shopping. We do not know enough about the actual process of browsing to say whether effective substitutes can be found; all that can be said is that none has been found yet.

Libraries need both holdings and access; the only question is the right balance between them. For all the rhetoric, few librarians deliberately acquire fewer materials; if they did, their users would protest vigorously. I do not doubt that more and more will have to be obtained from remote sources, but that does not mean that libraries should buy less, still less that they should subscribe to a dubious doctrine that will weaken their service to their users. An ideal policy would probably involve a combination of access to older materials, to save space and because browsing is rarely used for non-current materials outside the humanities, and substantial acquisitions of current materials to provide exposure. As noted earlier, if enough material is made available on CD-ROM, or some other medium that may supersede it in years to come, it may well be possible to once more give holdings priority over access, albeit not in an easily browsable form.

EUROPEAN LIBRARIES AS A UNIFIED SYSTEM

As stated near the beginning, this paper pays particular attention to Europe. Libraries in member countries of the European Union are likely to increasingly operate as a unified system. In addition, countries such as Switzerland and Norway which are not (yet) members are being treated as effectively members for library purposes. The catalogues of nearly all the main library collections in the EU should be accessible online within ten years, and those of Eastern Europe will gradually follow. As electronic technology makes national boundaries increasingly meaningless for document access and supply, much of Europe will become one bibliographic system; and the possible fragmentation of some countries, which I touched on above, makes the case for a united bibliographic Europe stronger still. There will be facilities for switching requests between libraries within the EU, and eventually beyond.

At present some European countries have poorly developed library (and interlibrary) systems, but this will gradually change, partly as a result of the various EC document access and supply initiatives. For some time however there will be problems with access to the holdings of some countries, not only Portugal and Greece but Spain and Italy. Even without this access, the vast majority of items wanted can be supplied from other libraries in the EU, particularly in Germany, the UK and France. Not surprisingly, most books requested on international loan are published in the UK and USA; many US books have joint imprints in the UK, and even if they did not, most of them must be available in the UK. For rather different reasons, the USA and UK are the countries most used by European countries overall as sources of supply for international loans: items can be easily located in the OCLC and RLG databases, and the British Library has near-comprehensive collections of significant English-language books. However, the use of US libraries may decline as the catalogues of European libraries become equally accessible. There will always be a small proportion of requests, mainly in the English language, that will need to be met from US and other (principally Australian and Canadian) sources; but there should be little problem in obtaining most of these.

PREDICTIONS

It is safe to make some predictions about the future:

- Commercial suppliers will continue to grow in importance, and possibly in number.
- The cost of published materials will continue to rise above inflation; but the cost, high as it is, will still be very small in relation to the cost of research and teaching.
- The annual output of published material will continue to grow; a higher and higher proportion will be available in electronic form, and some will be available only in that form; but print will not be superseded, only supplemented.
- Fax from printed pages or transmission from electronic text will become the norm for the supply of periodical articles[25].

Some impressive pilot systems for certain types of material claim to be moving in the direction of the virtual library (see e.g. Brandreth & MacKeigan[26]). However, the virtual library, whatever it means (there are several interpretations), is some way off yet, if indeed it ever arrives[illegible]; and it would be wise to plan on the assumption that conventional systems will continue to play a major role for the foreseeable future, although they will be enhanced by technology.

CONCLUSIONS

Cost

Access to monographs held nationally is likely to remain considerably cheaper than international access for a long time to come, unless postage rates within the European Union are equalized. Access to periodical articles within a country is also likely to be cheaper than from abroad, but perhaps not for long and probably not by much, if anything; if commercial suppliers supplant libraries as the main sources of articles, there will probably be little or no difference in charges, though there may still be some in cost because of telecommunications charges. However, if cost-effectiveness alone is used as the criterion it produces nonsensical results, especially where periodicals are concerned.

Speed of access

Books will always be supplied more slowly between countries than within them. In the case of periodicals, there is a difference of two or three days for photocopies sent by airmail, but this difference will disappear entirely as fax or electronic transmission becomes the norm.

Ease of access

National access will remain significantly easier than international access for books for some years to come, but there will be little difference for periodical articles.

A distributed national collection?

There is little or no point in trying to construct a "distributed national collection" as a matter of active policy (as opposed to providing access to what the nation's libraries happen to acquire). There is no means of predicting what is wanted either in the present or the future, apart from obvious materials, which are acquired by libraries anyway.

There is however a good deal to be said for concentrating substantial collections in a few large libraries, which can achieve economies of scale in supplying materials and which can serve as extensive browsing resources if needed. Other academic and research libraries should continue to serve as major sources of supply in the humanities and social sciences.

The de facto *distributed national collection*

All academic and research libraries, not just a few large libraries, must be adequately supported if they are to serve their local clienteles properly. They cannot rely on either national or international supply for most of what they need. If they are well funded their collections will together constitute a good *de facto* distributed national collection. The cost of publications, high as it is, is very small in relation to the cost of research and teaching, and should be easily sustainable by any developed country. Although it is unlikely that the funds made available to their parent institutions will be increased, there is a very strong case for spending a higher proportion of the institutional budget on learning and research resources.

For copiable materials that are not acquired by local libraries, there is no point in building up a national collection: they are, or will soon be, easily and cheaply accessible from anywhere. For non-copiable materials such as monographs, there would seem to be more of a case for building up a comprehensive national collection. Once beyond the "core", however, selection other than that inspired by individuals wanting specific items is very much a matter of guesswork; and it is doubtful if special efforts to build up a national collection would add more useful material than would extended local acquisitions, which are at least aimed at serving actual rather than hypothetical clienteles. As stated above, if local libraries are built up with good collections of books, a country will have a good national collection without the necessity for further effort. Academic libraries should reverse their practice over the last few decades of biasing their acquisitions towards science and technology, and spend more on the humanities and other subject areas where demand is widely scattered, where browsing is more important, where material retains its interest and value over a long period, and where access from external sources is poorer.

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APPENDIX:

Hypothetical examples illustrating the number of uses required to justify national acquisition in economic terms

BOOK		**PERIODICAL**	
Estimated costs			
Purchase		*Purchase*	
cost of hypothetical book	*£ 35*	*cost of hypothetical periodical*	*£ 300*
cost of processing	*£ 15*	*cost of processing*	*£ 40*
	£ 50		*£ 340*
Loan (cost to requester only)		*Photocopy (cost to requester only)*	
cost of national loan	*£ 10*	*cost of national photocopy*	*£ 10*
cost of international loan	*£ 15*	*cost of international photocopy*	*£ 12*

(Costs to supplier (c £6.00 per item) are not included because, although libraries in some countries incur them for items acquired from international sources, they incur similar costs when they supply items to foreign libraries, so that they often cancel out.)

Relative costs of national provision + access and international access

***6 uses**:*		***35 uses**:*	
national cost		national cost	
(6 x £10) £60 + £50 purchase	£110	(35 x £10) £350 + £340 purchase	£ 690
international cost		international cost	
(6 x £15)	£ 90	(35 x £12)	£ 420
***10 uses**:*		***170 uses**:*	
national cost		national cost	
(10 x £10) £100 + £50 purchase	£150	(170 x £10) £1700 + £340 purchase	£2040
international cost		international cost	
(10 x £15)	£150	(170 x £12)	£2040

Emerging Electronic Libraries in Europe : An Introduction into Some of the Cooperative Projects between Elsevier Science and Libraries

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Chris Kluiters is Market & Sales Development Manager of Elsevier Science and as such directly responsible for the implementation of the electronic full text programme known as Elsevier Electronic Subscriptions (EES) in Europe.

Before joining Elsevier in 1985 he graduated from the Library and Documentation School Faculty Publishing & Bookselling in Amsterdam.

Abstract

After the experimental project TULIP (The University Licensing Programme), as well as the introduction of the Elsevier Electronic Subscriptions (EES) programme in the USA at the beginning of 1995, Europe is now, at the end of 1995, the second region where Elsevier Science (ES) will concentrate its efforts, and work closely together with libraries on their implementation and development plans of their electronic library.

Until recently Europe was considered by many to be behind in IT/ Digital Library developments, compared to those in the USA, however in recent years a steep increase in the knowledge and the number of these types of projects has been shown. This short communication will deal with some of the projects where ES is already closely involved.

Also discussed is the new relationship between ES and Tilburg University, both serving their intermediate role for their international communities of authors and readers of scientific information.

The introduction of the Elsevier Electronic Subsriptions (EES) programme has led to a number of new developments and initiatives between Elsevier Science and academic, corporate and governmental libraries in Europe. In 1996 and 1997 a steep increase of these initiatives is foreseen.

For the first time all 1,200 ES journals are available in electronic form. The EES programme is the beginning of commercial distribution of these electronic titles. Scaling up from 43 titles (the original quantity of available titles in the TULIP project) to 1,200 is a major operation, which triggers new challenges at every level in the publishing cycle varying from production, distribution, integration and the actual dissemination of information.

An estimated 1,600,000 unique pages are published in these journals annually (and this figure is still growing exponentially) at five international publishing locations (Amsterdam, Oxford, Lausanne, New York, Shannon).

Of all these unique pages and articles the following datasets are available:

- Page image files (TIFF 5.0, 300dpi, CCITT FAX Gr.IV) of every page;
- Text files (OCR generated ASCII) full text of the articles;
- SGML Coded bibliographic files;
- Dataset Table of Contents files (a "sort" of contents file needed to rebuild the journal issues).

After validation at the ES office in Amsterdam, the files can be distributed to libraries at periodic intervals (read published issues in electronic form). The selection of titles is something which is covered under a tailor-made agreement.

In the majority of cases the license format which is proposed is a site license governing the authorized user group recognized by the institution. This is sometimes referred to as campus license, but it can go beyond that.

In my paper of last year at the Essen Symposium, I described the developmental route that a library may take in developing new electronic services from bibliographic information such as CAPCAS, towards the integration of electronic full text into the library's electronic information services. This gradual approach may be beneficial to many institutes considering starting their digital developments, especially since these developments require adjustments at staff (training, new working methods), systems (new hard-, soft- and firmware), and organisational levels (central approaches, collaboration with faculty, or computer data centre).

Tilburg University in the Netherlands is a prime case example of a university library taking this developmental route towards a digital library. Their developments go back some five years when they started outlining their thoughts and concepts. In the third and fourth quarter of 1994 a regular delivery started of EES files to their library and computer centre. In May 1995 practically all students and staff were given the possibility to have direct access to some 120 ES journal titles from their desktop PCs to the full text database directly, or via their Table-of-Contents service and database. Of course their electronic library is not only about primary information from academic journals. They have much more information electronically available than just that.

It is also important to point out that this development is a continuous process of upgrading the systems and services and a continuous evaluation. In the last five years Tilburg University has thus gained substantial expertise at all layers in their library and computer centre in building a digital library. In the meantime at ES we have also built a considerable pool of expertise in electronic information such as electronic publishing and dissemination, integration, introduction of new services and related subjects and new relationships with libraries.

This expertise is now made available through a private company named "Ticer" which stands for Tilburg Innovation Centre for Electronic Resources. In November of 1995 ES signed an agreement with Ticer to work closely together in the fields of consultancy and knowledge transfer and to make this expertise available to third parties. One of the first activities has been the organisation of a one day topical seminar on SGML implementations at libraries, held in November 1995.

In 1996 it is foreseen that similar types of seminars will be organised. Already scheduled is a seminar on the performance of full text retrieval software and database management systems.

Another activity will be the organisation of a new International Summer School. This summer school will be open for registration to librarians considering starting to build their own digital library, and will pay attention during a period of two weeks, to a broad range of both strategical and practical topics such as the changing roles of publishers, librarians, library automation suppliers and agents, information retrieval user interfaces and knowledge navigation; supply, acquisition and encoding of electronic documents. Added to these topics will be a substantial amount of case studies. Some 30 lectures will be given by international experts. Added to this will be hands-on sessions giving access to advanced tools and digital library projects and products.

As mentioned earlier, the EES programme has also led to new types of agreements for the delivery of EES full text files to other libraries. A noteworthy initiative in this respect may be the imminent collaboration between ES and the Royal Library in the Hague, The Netherlands.

In the Netherlands there is no legal depository for publications published with a Dutch imprint. The present depository for printed material however, is based upon an agreement between the Royal Library and the Royal Dutch Publishers Association. At this moment discussions are taking place in Europe between publishers and National Libraries to see if, and how the Electronic National Depositories are possible. ES and the Royal Library are now very close to an agreement on the delivery of those journal titles published in electronic form and with a Dutch imprint. These titles will be stored in what may become the very first Electronic National Depository worldwide.

Aesthetics and Quality in Format Conversion

Morten Hein
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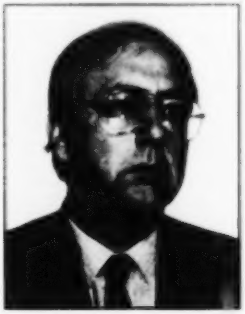


Morten Hein is Director of Hein Information Tools founded in 1988, a Library Consulting Company working in the areas of library management, statistics and economics, and specialised in technical and management aspects of library informatics. He has had a long involvement in Danish civil service supervising and guiding consultancy principally to public libraries and library cooperation as well as in the area of standardisation, being a former chairman of ISO TC46. Morten Hein has been involved with the European library issues since 1984 and has actively contributed his expertise and advice to the preparation of EU library activities since 1988.

Abstract

The information society has as one of its major components that information will be available one way or the other in an electronic format. This will either be existing information converted into an electronic format - or information created to be published in an electronic format.

Due to the constant change of technology the life cycle of an electronic format will tend to be shorter than the life cycle of conventional formats. If by any chance information will have an importance that goes beyond the life cycle of its original format or this information is desired in another context a format conversion may take place. In libraries and archives information may have an even longer life cycle than elsewhere.

When the first enthusiasm for electronic information has settled many institutions will find themselves in a constant change of technology with ever increasing problems. How many years will a PC based CD-ROM system be available to cope with existing CD-ROMs?

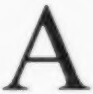
In this business of electronic formats and format conversion the technical problems will be overwhelming. Aesthetics and quality assurance issues for the content may be given a lower priority.

The paper will discuss these issues and give examples of problems with aesthetics and quality assurance. Present days' problems in conversions of text, images and sound will be given. There will be given no solutions so the paper will have a rather sad conclusion; there is no straight forward policy to follow. Another conclusion is perhaps more optimistic; after many years of working in the stone age there is now room for discussions of aesthetics in library automation.

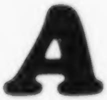
Introduction

This paper may look backward and extremely conservative. This is not the intention, but it presents none the less a certain scepticism on the road to the future library. I believe that a number of persons, including Melwyn Dewey, have been credited for the following bon mot: *The future comes by itself - to achieve progress you have to make an effort.*

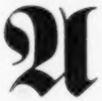
Let me show a picture:



It looks familiar and many may believe that this is an A. This is not completely wrong. Let me continue with a second picture:



and a third picture:



All three look as pictures of the letter A. And so they are. They show three different glyphs representing the logic letter A. The example with the letter A is made to bring the concept down to a simple dimension.

Any letter, script or text can more closely be identified by some parameters:

Image representation - the glyph. Language. Arts. Culture. Formal representation - say a hexadecimal value and - Time

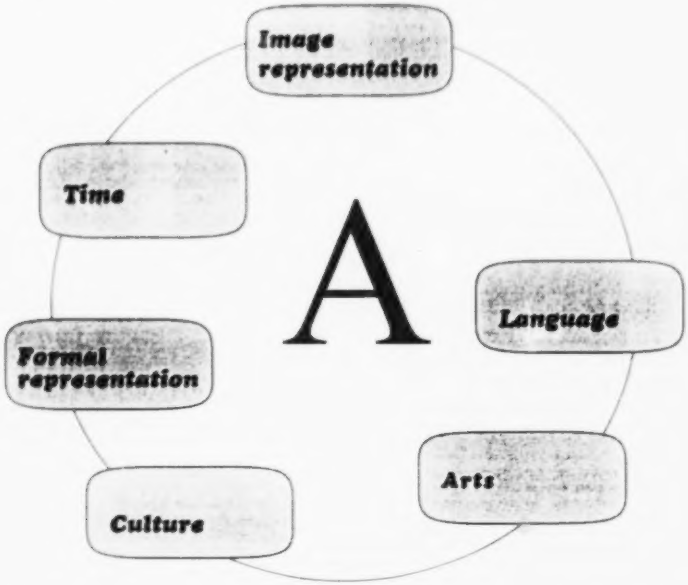


Image representation
Time
A
Language
Formal representation
Arts
Culture

These elements imposed to a text give among other things the context for the text. To change this will bring difficulties as crucial as making a translation of a text or to decide on how to stage a 200 year old play today.

A format change of a document is just as crucial - and format change of documents will be the agenda for the libraries in the years to come where the electronic and virtual library is not only a hypothesis but a live, substantial phenomenon.

On Quality

Our demands for quality in the media we are using have degraded through four decades of reading photocopies. A long sequence of non eligible copies and re-copies. Now - when copiers are far better than before - the low grade is kept alive by reading faxes. The fax machine has brought a new dimension to the deterioration of documents.

Television may be the biggest sinner. You can not read an A4 printed page from a television screen due to a low resolution. Try once to image the loss of quality and aesthetics value that has been caused by the television.

The lack of demand for quality is absurd in a time where printing is more sophisticated than ever. Anybody with a PC can produce printed text in a higher quality than a print-shop could do 50 years ago. However, our problems are not found in the printed media but in the new and electronic media.

When our first child was born it was for practical reasons impossible to go to the cinema during a long period. One day she was old enough to join for the first time. We had chosen an old movie, Chaplin's "City Light". I had expected that this film would have blurred and "woolly" images on the silver screen, but all my experience from television could be forgotten. This old movie had images that were bright and sharp. What a relief.

Everyone among the Internet freaks was amazed by the fact that a Rolling Stones concert was "televised" in Internet early in 1995 in a small window in a screen at a rate of frames per second at on third the normal - if the bandwidth allowed so. This was named an achievement but can scarcely by one hundred years after the Lumière brothers and their first moving images.

The television screen is appallingly bad. The screen used in most computer hardware today is far better than a television screen as for resolution but far away from the acceptable. Recently I found an Alice in Wonderland on a CD-ROM. As a test I tried to read the document from the screen. I could not do it. I thereafter spent quite some time in transferring the document into a decent layout on the screen using a facsimile of the original as pattern. I could not read that version from the screen either. As a matter of fact most people can not digest a written text of above 10,000 characters from a screen. From there on we start to print - and print. Any new development in quality should be welcomed and new application areas should seek new standards and image quality. The long story of HDTV would thus be beneficial to mankind - if that television standard ever emerges.

What is the Agenda for the Coming Years?

We will see a large amount of information appearing in one or another digital format. You can build a matrix of the following elements:

- Some electronic documents will be original information - others will be conversions.
- Some will be interactive - others will be linear (and even some of the linear documents will be interactive as well).
- Some documents will be commercial products - others will be produced by libraries or in a library information environment.

I will come back to this listing but will firstly address some general issues in digital information.

It is generally observed that go digitally is to play safe. It is generally assumed that digital information will not be lost. It will not deteriorate. Digital information can be copied without any loss in quality or content - in contrast to analogue based information. This may be true - but let me add some statements:

- Printing is digital in the above sense. Photocopying is analogue.
- An image file may be digital but the making of it may usually be an analogue process.
- Any compression technique applied to a digital document will create a new document of a digital appearance but with an analogue nature. Compression is made by calculation of proximities.
- Some compressed formats, e.g. the ever more popular MPEG format can not be reformatted without loss of information. In the worst case the information may disappear.
- Generally speaking, compressed formats - as known today - are dubious for any long term consideration, e.g. archiving.

Let me return to the tentative matrix: There will be a big difference for the libraries for documents produced by themselves and documents produced commercially and offered for sale. In the latter case you can acknowledge what is on the market and the techniques used and accept what is suitable with more or less known qualities and problems. The growing problem with commercial products may be that the library is often only leasing the information. There will be few preservation problems in the library. Preservation will be a problem only for the supplier.

There are many restraints - even today where we are so advanced. The great break-even point for electronic information in libraries came more than 20 years ago when the costs of magnetic media to store the information contained in 800 catalogue cards came below the costs of a drawer in a card catalogue cabinet.

Just now the commercial market for interactive CD-ROM documents is exploding and also coming closer to libraries because copyright agreements are made - and can be made. For some of these products you may question the quality of the information actually conveyed. Most documents have designs that at their best come close somewhere in between the comic strips I had as child and the computer games of today for children. Even serious information can look doubtful in this disguise.

I know that the usage of drawings is a method to lower production costs because buying proper images is expensive. However, the impression left with me makes me horrified if prolonged into the future. Our problem is that this style may appeal to the mass market. More serious producers without these fancy gadgets will simply be considered dull and will not be able to sell their products.

As a relief I hope that there always will be space for the specialist suppliers aiming at a small, however, important niche.

Electronic information is just now flooding into the mass market. It will come through several channels:

- It will be an add-on to the book-trade
- It will be complementary in the music and video trade
- It will be in toy shops
- and in computer stores

The libraries will be small players in that game. However, players with a long tradition and expertise that could influence the market. The libraries should take two positions:

- to expect information conveyed in an electronic document to be serious and reliable
- to expect that an electronic document has an appearance that meets some standards.

Libraries have joined the Internet fever. Recently a Danish newspaper discovered that the Internet was also an art gallery. Now art was for the masses. As an example they showed a painting of Edward Hopper taken from an Internet server somewhere. It is questionable if the source had the right - remembering copyright - to copy that painting. No question could be made whether the droit morale of Edward Hopper was violated. It certainly was. Apart from a picture of a house at the sea-side - a frequent object for Hopper - any other similarity could be questioned.

There have been few changes: The media is still the message. Anything done badly on Internet is better than anything else.

Libraries must try to influence the commercial scene with a demand for a certain quality in content and in appearance. This was seldom the case for books. For strange reasons printers and publishers have always used highly aesthetic measures in book production. Those measures will not come easily in the electronic document.

Now and then the library is declared dead, however, the body has yet to be found. In the middle of the information ocean the user can be characterised in three elements:

- ability to state requirements and formulate problems - or more precisely the problems in doing so
- knowledge on information structures and retrieval structures - or more precisely on the difficulties
- ability to handle IT equipment. Yes, the ability has grown and everything looks so user-friendly today.

Even with better IT solutions there will still be a major role for the libraries as the intermediary to information and knowledge.

Maybe triggered off by the enforcement of this role the libraries are moving from a more traditional role as keepers of information further on to providers of information - now seeking new grounds as compilers and producers of information. There are reasons to believe that most libraries - independent of type - in future will produce information.

- This information will typically be in an electronic format.
- The information will be either original in format or converted.
- There will be an option in the converted part of using conversion bureau's or having a local production in the library. Just as it was the case in microfilming and in retrospective conversion.

One might ask what the aim will be for a conversion or a new production:

- To supply information in a format known to the users
- To give better access by using a modern technology

  Access can be methods of penetrating a document
  Access can also be remote access

- To preserve information left in a fragile format or in a format so bulky, e.g. a book that a conversion is a feasible option

The first two motives are straight forward so I will jump to consider the third.

Preservation

The storage media of today are magnetic and optic. The magnetic medium is insecure but the digital technique makes it possible to re-copy before any damage has occurred without loss of information.

The optical technique has been given different life span for the actual products, but none has estimated the lifetime of technology itself.

CD-ROMs - the most popular medium - are off-springs from the CD-Audio. Without the mass market of music the CD-ROM would never have been available to the present low price. Therefore, if we want to look at the technology lifetime we can look at the lifetime of previous music storage systems:

- The Edison cylinder lasted less than 25 years
- The acoustic 78-record lasted 30 years
- The electric 78-record lasted 30 years, too, but was fading out the last 7 years
- The LP record lasted 40 years but was fading in its last 6 years
- The CD-Audio is already 13 years old

The large impact in electronic documents is coming now but based on a technology at least in its mid-life. How many can play an LP record today - or even worse - a 78-record. Who can play a CD in say 20 years?

Any information carrier of an electronic nature will only be accessible in an electronic environment composed of hardware and software. Even if a CD-ROM would last 100 years can it be played at that time? How long will the systems be alive?

How many years will a PC based CD-ROM system be available to cope with existing CD-ROMs? The major points of distress will, e.g. be: How long will the present CD-ROM format be in usage? How long will players to an obsolete technology be available? How long will the Intel based PC be available? How long will the software and the DOS Windows environments be available? Will new environments be backward compatible?

In libraries and archives information may have an even longer life cycle than elsewhere.

Quality Assurance

When libraries start to produce electronic documents they will probably not have the resources to do it properly. The overwhelming issue will be to transfer the intentions of the document into a new medium.

As demonstration I have chosen an example in music that can not be reproduced in a book. However, I will give sufficient references so that anyone can reproduce this example:

First you take an old recording. The example is here the aria "Una voce poco fa" from the "Il Barbiere di Siviglia" by Rossini. It is recorded by the soprano Louisa Tetrazzini in 1911.

The first example is an average worn copy played on a modern turntable with the ability to turn at 78. (HMV 2-053046)

The second example is a conversion done by Pavilion Record on their Pearl label on a CD. (GEMM CDS 9220)

The third example is a conversion done by Nimbus Record on their Prima Voce label on a CD. (NI7808)

If you repeat these examples by plying them yourself, you will note that the first record sounds terrible. You may wonder whether you can stand the noise. The second gives a certain impression of a very old record with noise. The third gives an impression of a wonderful opera-singer from early in this century. A more true reproduction of an ancient document. A masterpiece in sound conversion and a fine example for anyone working in document conversion.

Will libraries keep up to such standards in format conversions?

Lack of Conclusion

I have no conclusion except the wish to convey my desire to encourage the libraries to take aesthetics and quality assurance into consideration in the coming process of creating electronic documents. One good starting point could be to create a library lobby for the creation of a facility where you one day could enjoy reading Alice in Wonderland directly from an electronic device.

Electronic Documents and Information : From Preservation to Access

Conference Summary

Graham Waters
Swets & Zeitlinger, Frankfurt Main, Germany

Graham Waters began his professional career as a journalist in England. On moving to Germany he spent many years teaching English and holding training courses for management in a variety of industries. He joined Swets & Zeitlinger in Frankfurt as Sales Manager six years ago. In his present position he is responsible sales in Eastern Europe as well as for marketing of electronic media.

It is a great honour for me to be invited to summarise what has been an interesting and stimulating conference, rich in information. As always the themes are topical and are affecting, or will affect the lives of all of us in a diversity of ways. The task of summarising such a proliferation of information in just 15 minutes is perhaps not enviable, and calls for some serious data compression techniques.

This summary was, of course, prepared digitally using laptop publishing and a standard software package, which perhaps receives too much advertising already. I had thought of reading from my VDU, but if the power goes down or my hard disc crashes I would be more than speechless. I thus opted for a hard copy on conventional paper. Unfortunately I did not have time to engrave it in stone.

As both the abstracts and the conference papers will be published, I have tried, in addition to summarising the papers, to pick up on some of the points raised from the floor.

The opening talk captured the essence of the themes for the rest of the conference. On the one hand **Frank Oliver** projected the vision of the global, digital library and the desktop database. On the other, his practical experience - borne out by later speakers in a variety of contexts - brought us back to the harsh reality of today:

- The inexperience of the casual user, a point picked up later by Irene Sever among others,
- The lack of storage and computing power, and limitations on CD-ROM storage capacity
- Difficulties in gaining cooperation with publishers
- The, to me, surprising unavailability of fax machines
- and the inadequacy of displays, printers and Internet bandwidth,

cast a dark shadow between the idea and the reality. The dilemma is reducing the user base or supporting lower specifications.

To continue the permutation of Eliots quote on wisdom and knowledge it may be fair to say that we have found another place to lose information besides the library - cyberspace. Luckily no one here lost their head.

While Stanford students still struggle to grasp the intricacies of an OPAC installed in 1983 **Anthony Angiletta** and colleagues decided to "quit just talking about digitisation, put some money on the line and went ahead and did some". The result was the launch of Highwire Press and the *Journal of Biological Chemistry online*. The idea was born of another reality - the exponential growth in scientific and technical articles and publications to accommodate them. He reminded me of a colleague at the recent Frankfurt Book Fair who cast his eye wildly over the sea of publications and said despairingly "Who reads all this stuff?"

When JBC reached saturation point Stanford saw only one option - "to go electronic". Mr. Angiletta, who is obviously a seafaring man, made a plea for better navigational aids on the net.

Maurice Line raised the question of how future generations will access JBC archives. It seems that Highwire Press will have a guaranteed eternal existence.

In these days of shrinking budgets the question of money had to be addressed. **Frederick Friend** discussed a model for cost comparison between the conventional and the digital subscription.

He drew attention to the fact that new technology introduces new elements into the calculation such as:

- hardware costs
- technical staff salaries
- investment in electronic storage capacity

while pointing out that building and shelving costs for conventional media are seldom taken into account when decisions are made relating to print journals.

Maurice Line warned of the danger of giving control over electronic data to commercial companies and suggested that the pricing of today may give no indication of the costs of tomorrow.

Mr. Friend added that while counting costs may be fraught with variables which are hard to measure it is even more difficult to quantify the academic value of a publication. In this connection librarians can give valuable feedback to the publishers, a point later raised by Kathryn Arnold.

Shmuel Sever introduced a political element to the discussions. Information made widely available by the technology of the virtual library is one of the cornerstones of a democratic society and a buttress against extremism.

He suggested that savings on library building can be diverted into more compact digital information resources to improve access and education for a broader mass of the population. The fragility of digital information in countries troubled by civil unrest and even war was later addressed by Kerstin Dahl and Maurice Line.

There was a considerable run on hard copy versions of De Montfort University's "Model License for the Acquisition of Electronic Text and Images". Presumably we can download updates from the university database as they come along?

Mel Collier took us through the electronic copyright jungle and pointed out the main issues to be settled between the custodians of the virtual library and a key group of players in this complex field - the publishers. The model license goes a long way towards streamlining negotiations.

The Symposium was held in honour of **Patricia Battin** whose career has taken her from the problems of book preservation to the question of preservation of and access to electronic literature. She pointed out that ironically site licenses limit transmission of digital data between institutions, while more cumbersome paper copies may be freely shared. A preeminent concern is to achieve changes in copyright law which will enable libraries to share the task and the costs of archiving electronic data.

While faculty members are well-catered for with digital fare, the undergraduates, who rely more on books, find fewer resources in their virtual library. **Kathryn Arnold** discussed the problems of giving library support to students in the face of budget limitations and described pricing models for electronic books.

Stop press news on the latest initiatives of the European Commission on Preservation and Access was provided by **Klaus-Dieter Lehmann** and **Hans Rütimann** who had attended the conference the previous day. Modelled on the US Commission, the European body will seek to bring together and give support to experts in the field in order to gather recommendations on international cooperation to preserve and provide access to both print and digital collections.

Charles Hildreth surfed the Internet to find 90% of the sources for his presentation and discussed the tyranny of half-way and nearby technology of such diverse items as bicycles, spectacles, condoms and card catalogues. His interest is not the medium but the message - liberating it from the "book container". Does this mean that the best selling author who today sells a million can tomorrow proudly claim that he sold one digital book? As Mr. Hildreth pointed out, at least that author will never go out of print.

While questioning the value of bibliographic nostalgia he lamented the loss of personal interaction with books in the closed stacks of the virtual library, and made a plea for improved browsing facilities.

Sue Orchard, representing a commercial document supplier, UMI, discussed the pros and cons to be considered when chosing between document delivery, abstracting, indexing and full-text databases.

"Will those who educate today's librarians have to resort to science fiction in order to prepare them for their tasks in library management a decade into the future?" asked **Irene Sever**. In her paper she pointed out that demands are increasing on the librarian while at the same time the profession is undergoing a revolution. Increasingly emphasis is on teaching the librarian how to teach the user.

Kerstin Dahl posed a series of burning questions for **Sten Hedberg**. She pointed out that information in any medium is not available until there is interaction with human beings. Who, she asked, will ensure that the information is provided in an appropriate format.

Mr. Hedberg saw journals being phased out to be replaced by electronic publications held on institutional servers, and argued that libraries are responsible for ensuring authenticity of archives, preserving information and teaching users how to access it. At the same time libraries must monitor hard and software obsolescence and take appropriate steps. He picked up Charles Hildreth's theme, that the content, not the medium is important.

Maurice Line questioned the librarian's syndrome and pleaded for more selectivity. "If in doubt, chuck it out".

Werner Stephan used punctuation to make his point - with a question mark. Will the German Library achieve its aim of providing long-term preservation and access, and bibliographic control of electronic media? One precondition is an extension of the legal deposit law and the provision of funding.

Hermann Leskien described the policy of the German Research Association (Deutsche Forschungsgemeinschaft) in offering guidance to its members and to libraries on reorienting to the new media. He pointed out that researchers in different fields require very different, profile-oriented services from their library. Librarians will have to shape the future if they do not wish to be shaped by it.

A vote was taken on who should do the indexing and cataloguing, librarians or software. Charles Hildreth pointed out that there is no longer any decision to be made as software is already leading the way.

Commercial suppliers opened up new horizons for us. **Jenny Walker and Martin Fisk** discussed the philosophy and enabling technologies behind the Lion library automation system. The system aims to provide access to library information in whatever form, however or wherever it is stored, and whatever its coding.

While illustrating Goethe's penchant for poodles **Tony O'Rourke** presented examples of Chadwyck-Healey's pioneering activities in electronic publishing. He gave insights into the commercial aspects which companies must consider when launching into projects for the virtual library.

Maurice Line discussed the need for the Holy Grail of national self-sufficiency in library collections versus international access, facilitated by electronic technology. Important criteria are speed and reliability of supply, ease of use, national security and pride, and of course, costs. He suggested that libraries must find the right balance between holdings and access and argued that academic libraries should shift the acquisitions bias of recent years away from science and technology and back to humanities.

Christiaan Kluiters described the cooperation between Elsevier Science Publishers and libraries to develop electronic libraries, including the technology solutions as well as operational and organisational aspects.

We must ensure that aesthetics and quality assurance in electronic formats and format conversions are properly taken into consideration. **Morten Hein** warned of the distress faced by librarians as they battle to keep up with the rapid obsolescence of computer-based technology.

I would like to conclude by taking you into the future - to the year 3995. An eminent archeologist is holding a telepathic conference with other specialists around the globe while standing on the site of the former city of Essen.

An exciting discovery has been the ruins of the former university, which, unfortunately, was destroyed by an earthquake in the year 2563. The pre-stressed concrete rubble has mysteriously shaken down into the form of a pyramid. No one quite knows why.

Excavations have turned up the remains of the library. The archeologist is particularly excited by the discovery of a small yellow book, with a picture of a fox on the front, which he assumes is some kind of deity.

Deciphering the contents is proving a rather laborious process, but the script seems to be some archaic form of an English dialect.

A major problem is that none of the material in the library seems to be much older than this book, which is dated 2020.

Among the ruins was a fair amount of silicon and twisted metal. Of course, the inhabitants of old Essen used some kinds of primitive, silicon-based computers, but this has long been phased out by the introduction of organic based technology.

It is the archeologist's profound hope, that when he has deciphered the little yellow book, it will tell him where the people of the day stored their information, and above all, how they accessed it.

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